

**INFLUENCE OF STRATEGY FORMULATION ON THE RELATIONSHIP BETWEEN  
QUALITY MANAGEMENT SYSTEM AND ACCESS TO WATER AND SANITATION  
SERVICES IN KENYA**

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DEGREE OF DOCTOR OF PHILOSOPHY IN BUSINESS ADMINISTRATION**

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## **DECLARATION**

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I certify that this research thesis has not been previously presented for an award of a degree in Maseno University, or in any other University. The work herein has been carried out by me and all sources of information have been acknowledged by means of references.

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## **DEDICATION**

This work is dedicated to my late Mum, my wife Ruth, daughter Tercy and son Teddy.

## ABSTRACT

Access to water supply and proper sanitation is fundamental to the elimination of poverty and the achievement of Millennium Development Goals. In Kenya, over 3,100 children die annually for using unsafe water and poor sanitation. In the 2015/2016 financial year, access to water in Kenya stood at 54% for urban and 51% for rural areas. Previous studies have revealed the unsuccessful attempts to improve access of water and sanitation services through privatization and structural reforms. The purpose of the study was to establish the influence of strategy formulation on the relationship between quality management system and access to water and sanitation services. Specifically the study sought to determine the influence of the level of adherence to quality management system standards on access to water and sanitation services, to establish the influence of strategy formulation on access to water and sanitation services and to establish the moderating influence of strategy formulation on the relationship between quality management system standards and access to water and sanitation services in Kenya. The study was guided by a conceptual framework anchored on the Theory of Constraints (ToC) and the Resource Based Theory with quality management system standards as the independent variable, strategy formulation as the moderating variable and access to water and sanitation services as the dependent variable. A correlational research design was adopted. The target population consisted of the 86 water service providers in Kenya. A census was used where all the water service providers were included in the study. Primary data was obtained from the general manager of the water service providers through the use of questionnaires. Secondary data was obtained from the 2016 /2017 WASREB report. A pilot study using ten managers of randomly selected water service providers was conducted. The instruments were tested for reliability and validity through Cronbach Alpha's internal consistency index ( $\alpha=0.773$ ) for reliability and content validity index (CVI=0.833). The study found out that the influence of level of adherence to quality management system standards on access to water and sanitation services was statistically significant recording Adjusted  $R^2 = 0.82$  ( $t=15.2$ ,  $p=0.00$ ). It was established that the influence of strategy formulation on access to water and sanitation services was statistically significant recording Adjusted  $R^2 = 0.59$  ( $t=6.6$ ,  $p=0.00$ ). Lastly the study found out that strategy formulation had a statistically significant moderating effect on the relationship between the level of adherence to quality management system standards and access to water and sanitation services with change in Adjusted  $R^2 = 0.04$  ( $t=2.038$ ,  $p=0.047$ ). The study concluded that quality management system and strategy formulation influences the level of access to water and sanitation services, and strategy formulation moderates the relationship between quality management system and access to water and sanitation services. The study recommends that the management should enhance the level of adherence to quality management system standards and make the right choices in strategy formulation. Lastly the management should align their strategy formulation with the quality management system to enhance access to water and sanitation services. The study provides a model for strengthening the relationship between quality management system and access to water and sanitation services.

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## **ABBREVIATION AND ACRONYMS**

<b>ADB</b>	: African Development Bank
<b>ASALs</b>	: Arid and Semi-Arid Areas
<b>BPR</b>	: Business Process Re-engineering
<b>CBOs</b>	: Community Based Organizations
<b>DF</b>	: Degrees of Freedom
<b>DFID</b>	: Department for International Development
<b>EU</b>	: European Union
<b>GOK</b>	: Government of Kenya
<b>ICT</b>	: Information Communication Technology
<b>IFMA</b>	: International Facility Management Association
<b>ISO</b>	: International Standard Organization
<b>JMP</b>	: Joint Monitoring Programme
<b>LVWATSAN</b>	: Lake Victoria Region Water and Sanitation Initiative
<b>MDG</b>	: Millennium Development Goals
<b>NRW</b>	: Non-Revenue Water
<b>PA</b>	: Process Approach

<b>PDCA</b>	: Plan- Do-Check-Act
<b>PRSPs</b>	: Poverty Reduction Strategy Papers
<b>QM</b>	: Quality Management
<b>QMS</b>	: Quality Management System
<b>QMR</b>	: Operations managers
<b>SAM</b>	: System Approach to Management
<b>SDG</b>	: Sustainable Development Goals
<b>SMEs</b>	: Small and Medium Enterprises
<b>SSA</b>	: Sub-Saharan Africa
<b>TOC</b>	: Theory of Constraints
<b>UNDP</b>	: United Nations Development Programme
<b>WASREB</b>	: Water and Sanitation Regulatory Board
<b>WHO</b>	: World Health Organization
<b>WSP</b>	: Water Service Providers

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## **OPERATIONAL DEFINITION OF TERMS**

**Access to water and sanitation services:** The ability to get water and sewerage services as effectively and quickly as possible by the intended recipients. It was measured in terms of area of coverage, hours of supply per day and quality of drinking water.

**Continuous Flow:** This is where water flows continuously without stoppage. This was measured in terms of hours of supply per day.

**Drinking Water Quality:** This was measured in terms of residual chloride standards (40%) and bacteriological standards (60%).

**Employees' skills:** The capabilities that the individual employees demonstrate in the performance of their duties. They were measured in terms of the highest level of academic qualifications achieved, number of years worked and training and development programs attended.

**Infrastructure:** The buildings and pieces of equipment required in the provision of water and sanitation services. They were measured in terms of the production capacity, number of connections, storage capacity and sewerage infrastructure.

**ISO 9001:2008 Certification:** A formal acknowledgment by an accrediting body that the water service provider meets the quality management standards. The water service provider receives this award after successfully passing an audit examining how well the standards have been implemented.

**Labor Productivity:** A measure of the amount of goods or services produced in one hour of labour in the water service provider. It was measured in terms of the number of employees per 1000 connections.

**Level of Adherence to QMS Standards:** An extent to which the water service provider meets the standards that have been set in line with the quality management system. This was measured in terms of number of non-conformities detected by the QMS audit.

**Non-Revenue Water:** Water that has been produced and is lost before it reaches the customer through leaks, physical losses or apparent losses through theft or metering inaccuracies. Non-revenue water is measured in terms of amount of water lost in cubic meters.

**Operational Efficiency:** A state in which every resource is optimally allocated to serve each activity in the best way while minimizing waste and inefficiency. In this research, this was measured in terms of ratio of non-revenue water to net water produced, revenue collection efficiency, number of employees per thousand connections and revenue collection efficiency.

**Quality Management System Standards:** Levels of achievement that are seen to be acceptable as per the quality management system. In this research this was measured in terms of level of adherence to infrastructure standards, employees' skills standards and operational efficiency standards.

**Revenue collection efficiency:** It is the total amount collected by a water service provider expressed as a percentage of the total amount billed in a given period.

**Strategy Formulation:** This is where an organization specifies its objectives, develops policies and plans to achieve and attain these objectives, and allocates resources so as to implement the policies and plans.

## **CHAPTER ONE: INTRODUCTION**

This chapter presents the background to the study, statement of the problem, research objectives, statement of the hypothesis, justification of the study, scope of the study and the conceptual frame work.

### **1.1 Background to the Study**

To enhance efficiency, competitiveness and customer satisfaction an increasing number of companies water service providers included are developing or adopting quality management systems (Magd 2008). According to Anderson (2013), a quality management system (QMS) is a collection of business policies focused on achieving policy and quality objectives to meet customer requirements. In order to achieve the true value associated with quality management system, it should be aligned with the organization's strategic direction(Magd, 2008).

Strategy Formulation is an analytical process of selection of the best suitable course of action to meet the organizational objectives and vision. It is one of the steps of the strategic management process. A strategic plan, that is properly formulated, provides the organization with a well-structured planning mechanism, a well written mission and vision, an opportunity to base decisions and actions on formulated organizational policies and utilization of resource control teams(David, 2005).

According to the World Health Organization (2008) the water supply for each person must be sufficient and continuous for personal and domestic uses. These uses include drinking, personal sanitation, washing of clothes, food preparation, personal and household hygiene. Waterservice

providers all over the world are now beginning to realize that the only way to improve the access to water and sanitation services is by implementing the quality management system and supplementing this with well formulated strategy (Nanda, 2005).

Access to water supply and proper sanitation is fundamental to the elimination of poverty and the achievement of Millennium Development Goals (Kinoti, 2010). Globally, more than 3.4 million people die each year from water, sanitation and hygiene-related causes, 99 percent of these deaths occur in the developing world (WHO, 2008).

The water and sanitation crisis claims more lives through disease than any war claims through guns (UNDP, 2006). According to the United Nations (2006), about 1.1 billion people in the world do not have access to safe drinking water and approximately 2.4 billion people lack adequate sanitation. Water supply and sanitation in Kenya is characterized by low levels of access, as well as poor service quality in the form of interrupted water supply (Bichanga, 2013). This has given rise to over 3,100 children dying annually from diarrhea (UNDP, 2012). In the 2015/2016 financial year, water coverage in Kenya stood at 54% in the urban areas and 51% in the rural areas (WASREB, 2016). These statistics are too grim to be ignored and, therefore, they warranted investigation on possible causes and remedies. This study sought to relate this situation with quality management system and strategic management interventions.

As a means of improving access to safe water, many governments, Kenya included, have supported privatization of the water sector. The motivation behind privatization has largely been the perceived potential efficiency gains which is hoped could translate into increased access and improved service quality (Asingo, 2005). Despite the privatization of water provision units by the government, the provision of water services, considered in terms of area coverage, water

quality and hours of continuous supply is still unsatisfactory. In Zambia, for example, after the commercialization of water services, the accessibility to safe water decreased from 73% in 1990 to 53% in 2005 (World Bank, 2006). According to the impact report data on continuity of water supply in 2006-2007 financial year, only seven (7) out of 122 WSPs in Kenya were water supply continuous. Nevertheless, instances of water scarcity were still prominent in Kenya as shown by statistics on Eldoret, Homa Bay, Kisumu, Nakuru, and Kisii (Owuor, 2009). Water coverage in 2009/20010 financial year was recorded at 48%, 52% in 2010/20011, 53% in 2012/2013, 53% in 2013/2014, and 55% in 2014/2015 and 54 %, 2015/2016, (WASREB 2015/2016). This shows that privatization as an intervention in the water sector did not yield the desired results.

In an attempt to address the management crises legacy in the water sector, the Government of Kenya introduced reforms in the water sector through the Water Act (Republic of Kenya, 2002). Several reforms have been implemented within the water sector in Kenya. However, water service studies done within the sector reveal that the management of water resources and water supply has continued to be a major problem. Water reforms have not been sufficiently implemented as expected since most of the expected outcomes of the water sector have not been attained (Wambulwa, 2008). These efforts concentrated on industrial organizational factors ignoring the management practices in the water service providers; hence, a concept worth an investigation. It is also evident that the structural reforms adopted by the government have not produced the intended effect on the access to water and sanitation services probably because of the management practices in the water service providers. This is a question that this study sought to answer.

Studies conducted by the Ministry of Water and Irrigation on the national water strategy in Kenya between 2005 and 2007 discovered that the institutional frameworks to effectively carry



out the water sector reforms were not properly functional. Moreover, the water sector lacks resources and capacity required to carry out the water sector reforms (Ombogo, 2009). However these studies only concentrated on factors from outside the water service providers as means of improving access to water and sanitation servicesignoring the management practices such as the quality management system and the strategy formulation which this study investigated.

Over the years, the number of organizations certified for ISO 9001:2008 in many countries has grown tremendously (Heizer& Render, 2009).Quality management systems (QMS) is an emerging field of study that has gradually gained momentum in the recent years due to the competitive demand for quality services but not yet fully developed and understood (Bayati&Taghavi, 2007). It was, therefore, worthwhile to investigating the extent to which quality management system and strategy formulation has impacted on the access to water and sanitation services.

Magd et al. (2012) carried out a study on factors motivating the implementation of quality management systems in UAE organizations. The study found that organizations implements ISO standards both for internal and external reasons. The study also found out that internal reasons were found to be more dominant than external reasons. Kim et al. (2012) carried out a study on ISO 9000 certified manufacturing and service firms in Japan. The study found a positive relationship between QM Practices and innovation. Kaynak et al. (2005) found out that high performing firms had implemented QM practices to a greater extent than low performing firms, which shows that QM practices can definitely add advantage. Lo et al. (2009) revealed that ISO 9000 standards implementation in US manufacturing firms led to decrease in number of inventory days and significant improvement in overall operating cycle time. Zeng et al. (2005) carried out a study on implementation of ISO 14000 standards on selected Chinese industries.

The results reveal that much motivation of companies was just to enter international market, although other benefits were also found. Martínez - Costa et al. (2008) studied implementation of TQM Practices and ISO 9000 Standards together, rather than separately, as done in many research studies. It was found that internal motivation to implement ISO 9000 standards resulted in high performance, whereas external motivation did not.

Kungu (2010) conducted a study on the Implementation of ISO 9001:2008 Quality Management Systems at Total Kenya Limited. She conducted the research by way of case study of Total Kenya Ltd by use of in-depth interviews of the ISO team. The study revealed that there overall quality had improved in the organization following the implementation of QMS ISO 9001:2008.

Kimani (2008) carried out a study on the Role of ISO 9001 Certification in developing competitive advantage for Kenyan Organizations. The study was done using a descriptive survey that targeted all firms that had been certified by end of July 2007. The data was collected using a questionnaire. The results showed that certification to ISO 9001 are a source of competitive advantage to the Kenyan firms over their rivals. A certified firm has developed unique resources in form of enlighten human resources and a robust management system structures. It further ascertained that the benefits of certification clearly outweigh the challenges such as the high cost on regular surveillance audits.

Studies done by Magd et al. (2012); Kim et al. (2012); Kaynak et al. (2005); Lo et al. (2009); Zeng et al. (2005) , Martínez - Costa et al. (2008), Kungu (2010) and Kimani (2008) were similar in the sense that they attempted to establish the implementation of quality management systems both the manufacturing and service firms. These studies were different in the sense that while

Magd et al. (2012); Kim et al. (2012); Kaynak et al. (2005); Lo et al. (2009); Zeng et al. (2005) looked at the implementation of quality management alone while Martínez - Costa et al. (2008) investigated the implementation of a combination of the quality management system and the total quality management. These studies were limited in the sense that they did not address the level of adherence to specific quality management system standard.

Psomas and Kafetzopoulos (2012) carried out in ISO certified and non-certified manufacturing firms in Greece. The study findings found out that ISO certified manufacturing firms significantly outperformed the non-certified ones with regard to product quality, firm performance, operational, market and financial performance. Psomas, Pantouvakis and Kafetzopoulos (2012) carried out a study on the effect of Quality Management Practices on operational performance of service industries in Greece. The findings revealed that the product quality and operational performance of the service firms are positively and significantly influenced by ISO's effectiveness. Kagumba and Gongera (2013) conducted a study to establish the effectiveness of ISO certification on firm performance, employee productivity, inflow of revenue and internal procedures and processes in Kenyatta University. The study established that appreciation and participation in ISO certification resulted in improved firm performance. Anyango, Wanjau and Mageto (2010) established that quality management practices influenced positively the financial resource management and firm performance. Mungula (2013) undertook a study on effect of quality management system on the organization performance in Tanzania. The study found out that the quality and quantity of the organizations that had implemented quality management system had significantly improved. Matata (2015) undertook a study on the effect of quality management system on the performance of Kenya Ports Authority. The study found out that there is a significant positive impact on the performance of the organization

through improved service delivery. Ikay and Aslan (2011) carried out a study on the difference between ISO-certified and non-certified firms on performance. The results showed no statistically significant difference between certified and noncertified firms in terms of performance.

Studies done by Psomas and Kafetzopoulos (2012); Kagumba and Gongera (2013); Anyango, Wanjau and Mageto (2010); Mungula (2013); Matata (2015) and Ikay and Aslan (2011) are similar in the sense that they investigated the influence of quality management system on organizations performance. These findings were different in the sense that while Ikay and Aslan (2011) found out that there is no statistically significant difference between certified and noncertified firms in terms of performance. Kafetzopoulos (2012); Kagumba and Gongera (2013); Anyango, Wanjau and Mageto (2010); Mungula (2013); Matata (2015) found that quality management system leads to increased customer satisfaction, increased profits and reduced wastes. However none of these studies investigated how quality management system can be moderated by strategic management system in enhancing access to water and sanitation services.

Studies conducted using the Resource Based Theory have identified skills, processes and assets (operationalized as infrastructure, employees skills and operational efficiency in this study) as possible leverages for converting resources into a competitive advantage in this current study, access to water and sanitation services, (Miller, 2003). In line with this the quality management system sets standards on infrastructure, employees skills and operational efficiency.

Asante (2010) conducted a study on quantifying the cost of sustainable water services in selected small towns in central region of Ghana. The study found a significant relationship between infrastructure and sustainable water service delivery in rural water sector in Ghana.

VonDach(2007) conducted a study on the process of improving access to water and sanitation services in Kenya. The study recommended an optimal integration of water resource management in the country so that all citizens can have adequate water.

The studies done by Asante (2010) and VonDach (2007) were similar in the sense that they addressed the importance of water resource infrastructure in improving the access to water and sanitation services. These studies were different in the sense that Asante (2010) attempted to quantify the cost of sustainable water services while VonDach (2007) assessed how investing on water and sanitation infrastructure can help improve the access to water and sanitation services. Asante's study was based on selected towns in Ghana and therefore, the findings cannot be generalized to other parts of the world. These studies did not address how the level of adherence to QMS infrastructural development standards and strategy formulation has impacted on the access to water and sanitation services in Kenya, which this study sought to address.

Siqalaba, Mckenzie and Wegelin (2012) carried out a study on the role of training and capacity building in the implementation of water demand management in South Africa. The study found out that the key challenge in the water service providers was the development of skills and the integration of community education. Dearden, Reed and Reenen (2005) carried out a study on impact of training on productivity and wages. The study found out that training is significantly associated with high productivity. Savery and Luks (2004) carried out a study on influence of training on organizational outcomes in Australia. The study found out that firms regarded skills as an important precursor for improved productivity. Salleh, Yaakuub and Dzul kifli(2011) carried out a study on the influence of skills levels on job performance of public service employees in Malaysia. The study found out that skills' level of employees have no effect on their performance.

The studies done by Dearden, Reed and Reenen (2005) and Savery and Luks (2004) were similar in the sense that they assessed the effects of employees' skills on organization performance. These studies differed in the sense that Dearden, Reed and Reenen (2005) carried out a study on the impact of training on productivity and wages while Savery and Luks (2004) assessed the impact of training on the organization outcomes. Savery and Luks (2004) assessed the impact of training on productivity. These studies failed to address how the level of adherence to QMS standards on employee's skills and strategy formulation have impacted on access to water and sanitation services in Kenya. This is what this study addressed.

Bichanga (2013) carried out a study on the factors influencing financial viability of water service providers in Kenya. The study found out that operational inefficiency in the water service providers contributed to limited water access. Mosha (2014) carried out a research on the effects of water pipe bursts on water quality and non-revenue water in Arusha city. The study found out that this was as a result of illegal connections, leakages from the water system, corruption and bribery. The study also found that this had a negative effect on profitability. Kayanga and Njiru (2007) undertook a study on the improvement of water service provider's management in Kenya. Kangangi (2015) undertook a study on the determinant of non-revenue water in water services provision in Kirinyaga County in Kenya. The study found out that non-revenue water was as a result of non-detected leakages, pipe bursts, illegal connections, faulty meters and meter bypasses.

Studies done by Bichanga (2013), Mosha (2014), Kayanga and Njiru (2007) and Kangangi (2015) were similar in the sense that they assessed the influence of operational inefficiencies on the performance of the water and sanitation sector. These studies were different in the sense that Mosha (2014) and Kangangi (2015) looked at the operational inefficiencies in terms of non-

revenue water while Mosha (2014) looked at these inefficiencies in terms of employees' productivity. These studies did not address how the level of adherence to QMS standards on operation efficiency has impacted on the access to water and sanitation services in Kenya.

Ujunwa and Modebe (2012) carried out a study on the adoption of strategic management approach in the capital market development in Nigeria. The study noted that strategy formulation did not only promote the efficiency of the capital market, but it also leverages its role in promoting economic growth. Askarany and Yazdifar (2012) investigated the dissemination of strategic management tools. The study examined the relationship between the adoption of strategic management tools and organizational performance in both manufacturing and non-manufacturing organizations in New Zealand. The study found out that there is a significant association between the dissemination of strategic management tools and organizational performance. Muogbo (2013) carried out a study on the effect of formal strategic management on organizational growth and development in 21 selected firms in Nigeria. The study found out that application of formal strategic management had a significant effect on the firms' competitiveness. Njiru (2014) carried out a study on implementation of strategic management practices in the water and sanitation services in Kenya. The study used a survey research design. The study found out that implementation of strategic management practices is positive allowing organizations to increase profit when accommodating customers' needs.

Studies done by Ujunwa and Modebe (2012), Askarany and Yazdifar (2012), Muogbo (2013) and Njiru (2014) are similar in the sense that they assessed the influence of strategic management practices on the organizational performance and competitiveness treating strategic management as an independent variable. However, the studies are different in the sense that while Ujunwa and Modebe (2012) used a case study research design, Askarany and Yazdifar

(2012) and Muogbo (2013) used a survey research design. However, none of these studies treated strategy formulation as a moderating variable.

A moderating variable is introduced when we are expecting the model is a contextual one but when the third variable appears the existing relationship changes the direction, strengthens or weakens the relation, Baron and Kenny (1986). In order to achieve the true value associated with quality management system, it should be aligned with the organization's strategic direction (Magd, 2008). This suggested that a moderating variable like the strategy formulation can have a strong influence on the strength and direction of the relationship between the level of adherence to quality management system standards and access to water and sanitation services. This moderating role of strategy formulation warranted an investigation.

Seedee (2012) carried out a study on moderating role of business strategies on the relationship between best business practices and firm performance. The finding indicated that the relationship between best business practices and firm's performance could be influenced by business strategies. Sagwa, K'Obonyo and Ogutu (2015) conducted a study on moderating effect of competitive strategy on the relationship between employee outcomes and performance of firms listed on the Nairobi securities exchange. The results indicate that competitive strategy moderates the relationship between employee outcomes and firm performance. Rosli & Mahmood (2013) carried out a study on moderating effects of human resource management practices and entrepreneur training on innovation and small-medium firm Performance. The study found that the employee training interacted with innovation and significantly influenced organization performance.



Previous studies on relationship between strategy management and organization performance used strategy formulation as an independent variable thus they did not address the moderating role of strategy formulation on the relationship between adherence to quality management system standards and access to water and the sanitation services. As suggested by Magd, (2008) in order to achieve the true value associated with quality management system, the organization should align the quality management system with its strategic direction. (Magd, 2008). Therefor strategy formulation can have a strong influence on the strength and direction of the relationship between the level of adherence to quality management system standards and access to water and sanitation services. This moderating role of strategic management system warranted an investigation.

## **1.2 Statement of the Research Problem**

In Kenya, over 3,100 children die annually for using unsafe water and poor sanitation. In the 2015/2016 financial year, access to water in Kenya was 54% for urban and 51% for rural areas. This marked a growth rate of 1% per annum which pales in comparison with the Sustainable Development Goals (SDGs) target of ensuring availability and sustainable water and sanitation for all. This low access to water and sanitation services could be as a result of the management practices in the water services providers. Previous studies have revealed the unsuccessful attempts to improve access of water and sanitation services through privatization and structural reforms in the water sector. These studies, however, concentrated on industrial organization factors such as legal and regulatory framework as means of improving access to water and sanitation services ignoring management practices such as the quality management system and the strategic management practices. As quality management system (QMS) has been implemented to remedy the situation, it has been observed that it does not guarantee improved

performance. There is need for consistence of an organization's strategic directions and the quality management system in achieving the true value associated with it. Prior studies have sought to establish the effect of quality management system on organization performance as well as the effect of employees' skills, infrastructure and operating efficiently on service delivery. Other studies have sought to establish the relationship between strategic management and organization performance and none have sought to establish the influence of strategy formulation on access to water and sanitation services. It has been suggested that the quality management system should be aligned with the organizations strategic direction. However, none of the past studies sought to establish how strategy formulation moderates the relationship between the level adherence to quality management system standards and access to water and sanitation services in Kenya.

### **1.3 Objectives of the Study**

The study sought to achieve the following objectives.

#### **1.3.1 General Objective**

The general objective of this study was to examine the influence of strategy formulation on the relationship between quality management system and access to water and sanitation services in Kenya.

#### **1.3.2 Specific Objectives**

The specific objectives of this study were to:

1. Determine the relationship between level of adherence to quality management system standards and access to water and sanitation services in Kenya.

2. Establish the influence of strategy formulation on access to water and sanitation services in Kenya.
3. Establish the influence of strategy formulation on the relationship between quality management system standards and access to water and sanitation services in Kenya

#### **1.4 Statement of Hypotheses**

The study tested the following hypotheses:

**H<sub>01</sub>:** There is no statistically significant relationship between the level of adherence to quality management system standards and access to water and sanitation services in Kenya.

**H<sub>02</sub>:** There is no statistically significant influence of strategy formulation on access to water and sanitation services in Kenya.

**H<sub>03</sub>:** Strategy formulation does not have statistically significant influence on the relationship between quality management system standards and access to water and sanitation services in Kenya.

#### **1.5 Study Justification**

This study is expected to contribute to the current body of knowledge in the water and sanitation sector in terms of the implication of quality management system standards and strategy formulation on access to water and sanitation services. The management of water service providers may greatly benefit from the findings of this study since it will enable them to recognize the effects of level of adherence to quality management system standards and strategy formulation on access to water and sanitation services in Kenya and consequently, their commitment to the adherence to such standards. Researchers may gain from the findings of this

study as they carry out research in related areas. This study may as well trigger general awareness to scholars in relation to the benefits of adherence to quality management systems standards and strategy formulation. The customers, who are the members' of the public, may benefit from the implementation of the recommendations of this study as it may enhance access to water and sanitation services.

### **1.6 Scope of the Study**

This study examined the influence of strategy formulation on the relationship between quality management system standards and access to water and sanitation services in Kenya. The target population consisted of the 86 water service providers that submitted data to WASREB during the 2016/2017 financial year in Kenya. The participants of this study included the 76 general managers of the water service provider in Kenya. This is because they are the process owners in the quality management system and they are the formulators of the strategic plans of the organization. This made them informative on issues related to level of adherence to QMS standards and the strategy formulation. The study variables included the level of adherence to quality management system standards as the independent variable, strategy formulation as the moderating variable and access to water and sanitation as the dependent variable. The study covered the 2016/2017 financial year.

### **1.7 Conceptual Framework**

The study was guided by the Theory of Constraints (Goldrat, 1980) and the Resource Based Theory (Barney, 1991). The study was modelled on the conceptual framework that shows the quality management system standards as the independent variable, the strategy formulation as the moderating variable and the access to water and sanitation services as the dependent variable.

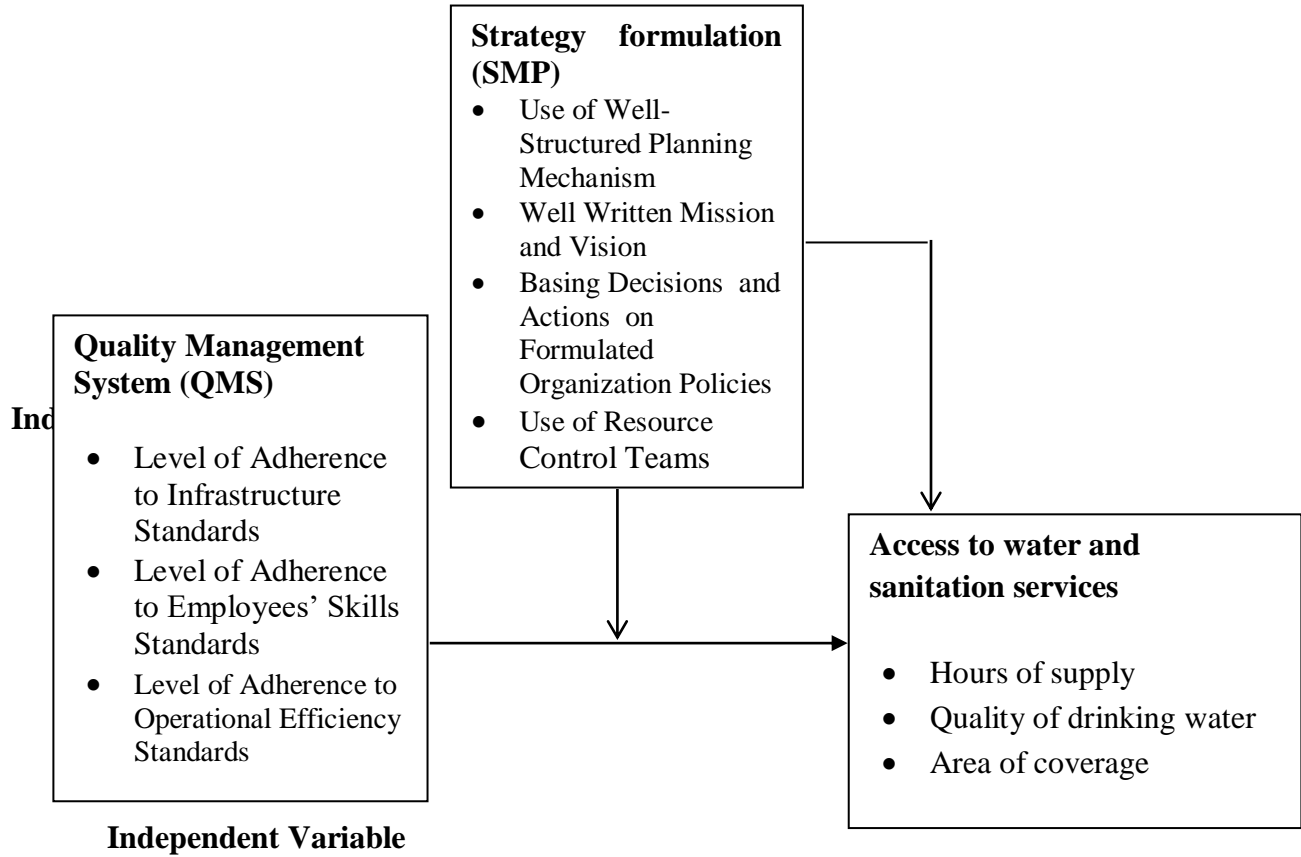
The Theory of Constraints by Goldrat (1980) postulates that every organization has at least one constraint that prevents the management from achieving its goal to a large degree (Goldrat&Cox, 1992). The Theory of Constraints argues that the secret to success lies with how the system interacts with these constraints to get the best out of the whole system, (Miller2003). In an endeavor to overcome these constraints, organizations have implemented the quality management systems. In this study, the quality management system involves adhering to standards that have been set on employee's skills, assets (infrastructure) and processes (operational efficiency). According to Asingo (2005), access to water and sanitation services can be measured in terms of area of coverage, water quality and hours of continuous supply.

The Resource Based Theory postulates that competitive advantage can be derived from resources and capabilities from within the organization (Barney, 2001). Studies conducted using the Resource Based Theory have identified skills, processes and assets (operationalized as infrastructure, employees skills and operational efficiency in this study) as possible leverages for converting resources into a competitive advantage in this current study, access to water and sanitation services, (Miller,2003).

In order to achieve the true value associated with quality management system, the organization should align the quality management system with its strategic directions (Magd, 2008). In this regard, the water service providers supplement the quality management system with strategy formulation such as the use of well-structured planning mechanism, communicating its mission and vision to all stakeholders, basing decisions and actions on formulated organization policies and use of resource control teams. This is likely to supplement the quality management system in order to enhance the access to water and sanitation services. This study therefore, investigated the

moderating influence of strategy formulation on the relationship between quality management system and access to water and sanitation services.

**Moderating variable**



**Dependent Variable**

**Figure 1.1 Conceptual Framework depicting the influence of Strategy formulation on the Relationship between quality management system Standards, and Access to Water and Sanitation Services**

Source: Adapted from Goldrat(1980) and Barney (1991)

The independent variable which in this case is the quality management system was measured using the level of adherence to infrastructure standards, employees skills standards and operational efficiency standards, whereas the dependent variable which is the access to water and sanitation services was measured using water coverage ,quality of drinking water and hours of supply per day and strategy formulation which were measured in terms of use of well-structured planning mechanism, having a well written mission and vision ,basing decisions and actions on formulated organization policies and use of resource control teams were posted to moderate the relationship between Quality management system and the access to water and sanitation services.

## **CHAPTER TWO: LITERATURE REVIEW**

This chapter reviews the literature related to the effect of strategy formulation on the relationship between quality management system and access to water and sanitation services. It starts with reviewing the theoretical perspectives and the concepts of the study followed by a review of empirical studies. A summary of the literature review is then presented.

### **2.1 Theoretical Perspective**

A theory is a system of interconnected ideas that condense and organize knowledge, depicting a world view about a phenomenon (Neuman 2006). This study was mainly grounded on the Theory of Constraints (TOC) and supplemented by the Resource Based Theory.

#### **2.2.1 The Theory of Constraints**

The Theory of Constraints (TOC) is a multifaceted management philosophy which emerged in the early 1980s and which is credited to Goldratt, an Israeli physicist who has made a remarkable impact in the business world in the United States of America (Mabin&Balderstone, 1999). The core tenet of the TOC is that every organization has a few constraints that prevent management from achieving its goal to a large extent (Goldratt& Cox, 1992). The TOC has developed rapidly in terms of both methodology and area of applications. In the late 1970's, the TOC was used for investing production which was a departure from the previously accepted methods such as material requirement planning (MRP) (Goldratt, 1980). Studies based on the TOC revealed that the secret to organizational success depends on how the system interacts with these constraints and how to get the best out of the whole system. An internal constraint is evident when the market demands more than what the system can deliver. In this study, the variable of market demand resident in the TOC is equated to the unmet demand for access to water and sanitation services in Kenya. Further, the TOC identifies internal constraints to include equipment, people



and policy operationalized in the current study they have been identified as infrastructure, employee's skills and operational efficiency. The TOC prescribes that organizations should discover the constraints and dedicate their efforts to mitigate the scenario. For the purpose of this study, these efforts are operationalized as the quality management system. Consequently, the study investigated quality management system operationalized as adhering to standards that have been set on equipment in this study the infrastructure, people in this case the employee's skills and processes in this study the operational efficiency. The TOC was, therefore, applicable to this study because it suggests why the quality management system involves setting standards on infrastructure, employees' skills and operational efficiency as a means of improving access to water and sanitation services from the water service providers.

The main limitation of the theory of constraints is that there is always one constraint that has the greatest effect, when the business deals with it another constraint becomes the most important. To mitigate the effect of this the managers can reduce the effect of the constraint as they identify them and use the theory of constraints to guide them in continuously improving company's performance as it has been recommended in the quality management system.

### **2.2.2 The Resource Based Theory**

To investigate the supplementary role of strategy formulation, the study was also guided by the Resource Based Theory. The Resource Based Theory was developed by Barney in 1991 (Barney, 2001). However, the initial ideas of the Resource Based Theory had commenced with the work of economists such as Chamberlain as early as the 1930s, evolved through the contributions of researchers, such as Ansoff in the 1960s and 70s and was formalized through the conceptual development of the topic in the late 1980s (Fahy, 2000).

The Resource Based Theory postulates that competitive advantage can be derived from resources and capabilities from within the organization (Barney, 2001). The Resource Based Theory provides a very useful taxonomy for the analysis of the contribution of specific business disciplines to organizational value creation. Studies conducted using the Resource Based Theory have identified skills, processes and assets (operationalized as infrastructure employees skills and operational efficiency in this study) as possible leverages for converting resources into a competitive advantage in this current study, access to water and sanitation services to the members of the public (Miller, 2003). The theory can, therefore, be used to investigate the supplementary role of strategy formulation on the relationship between the quality management system and the realization of the water service provider's goals. This is a goal which is meant to improve the access to water and sanitation services to the members of the public.

The main critique of the resource based theory is its inability to provide adequate conceptual bases for identifying valuable resources. To overcome this shortcoming the study borrowed from the environmental models such as the SWOT analysis. The traditional strengths, weakness, opportunities and threats model of the firm's performance suggests that firms are only able to improve only when their strategies exploit opportunities or neutralizes threats (Sanchez 2008).

### **2.3 Concept of Quality Management Systems, Strategy formulation and Access to Water and Sanitation Services**

This study sought to investigate the concept of quality management systems, strategy formulation and access to water and sanitation services.

### **2.3.1 Concept of Quality Management Systems**

According to Anderson (2013), a quality management system (QMS) is a collection of business processes focused on achieving policy and quality objectives to meet customer requirements. The QMS is expressed in the organizational structure, policies, procedures, processes and resources needed to implement quality management. To enhance efficiency, competitiveness, and customer satisfaction, an increasing number of companies are developing or adopting a quality management system (QMS) (Magd, 2008). In many instances, a quality management system is established in association with certification under the ISO 9001:2008 international quality standard. The purpose of the ISO 9001 standard is to assist companies of various sizes in any sector to implement and operate an effective quality management system by enhancing the firm's ability to design, produce and deliver quality products and services (Wahid & Corner, 2009). The standard, therefore, provides guidelines on procedures, controls, and documentation for identifying mistakes, streamlining its operations, and maintaining a consistent level of quality (Karth, 2004).

Quality management systems, especially ISO certification which is applicable to all types of firms, are widely used in developed countries all over the world (Zutshi & Sohal, 2005). Moreover, the same trend is picking in developing countries (Casadesus, Marimon & Heras, 2008). Kenya is still in the development phase, and the quality of products by manufacturing firms is still not up to standard; therefore, there is need to enhance the quality of manufactured products to spur economic growth. Even though, the number of ISO certified firms is on the increase, the product quality is still wanting.

Kaziliunas (2010) noted that continuous improvement is a post-certification stage where the maintenance of quality system is carried out. This stage is important if the company wants to

continuously improve and reap the long-term benefits of ISO certification. During post-certification period, an organization stands to reap the long-term benefits by having a quality management system that enables it to engage in the continuous improvement of processes, employee training and systems, continuous quality audits and benchmarking.

### **2.3.2 Concept of Strategy Formulation**

Strategy Formulation is an analytical process of selection of the best suitable course of action to meet the organizational objectives and vision. It is one of the steps of the strategic management process. The strategic plan allows an organization to examine its resources, provides a financial plan and establishes the most appropriate action plan for increasing benefits. The formulation of a sound strategy facilitates a number of actions and desired results that would be difficult otherwise. A strategic plan, that is properly formulated, provides the organization a well-structured planning mechanism, a well written mission and vision, an opportunity to base decisions and actions on formulated organizational policies and utilization of resource control teams. (David, 2005).

According to Mehra (2001) strategic decisions are basically the essential core of the strategic management. Strategic management represents the concept of how to utilize the resources of the organization in the most efficient way possible, with the variable environment as a reference point. In the process of strategic decision-making many factors have their impact including the complexity of the environment, the system of values as well as motivation. The strategic decisions lead to the improvement of the strategic position and the resolute action taking in the present. In long term strategic decision making there's the probability of not being able to foresee all the business possibilities in short term. In terms of discontinuity, the business subjects must possess flexibility for quick response to changes, which may occur, as well as focus on the

possibilities, which can bring about long-term positive results. Long-term strategic decision-making can bring positive results if there's confidence in the strategic programs and plans.

### **2.3.3 Concept of Access to water and sanitation services**

According to the World Health Organization (2008) the water supply for each person must be sufficient and continuous for personal and domestic uses. These uses include drinking, personal sanitation, washing of clothes, food preparation, personal and household hygiene. World Health Organization recommend between 50 and 100 liters of water per person per day. The water required for each personal or domestic use must be safe, therefore free from micro-organisms, chemical substances and radiological hazards that constitute a threat to a person's health.

According to WHO (2008), everyone has the right to water and sanitation service that is physically accessible within, or in the immediate vicinity of the household, educational institution, workplace or health institution. The water source has to be within 1,000 meters of the home and collection time should not exceed 30 minutes.

Water Coverage refers to the number of people served with drinking water by a utility expressed as a percentage of the total population within the service area of a utility. It assesses performance in executing the core mandate of the utility of supplying potable water to consumers. Drinking Water Quality (DWQ) measures the portability of the water supplied by a utility. It is a critical performance indicator since it has a direct impact on the health of consumers. This is a composite indicator measuring compliance with residual chlorine standards (40%) and bacteriological standards (60%). Hours of Supply refers to the average number of hours per day that a utility provides water to its customers. It measures the continuity of services of a utility and thus the availability of water to the customer. It is an important indicator on quality of

service and shows the extent to which the utility is making progress towards the fulfilment of the human right to water and sanitation in terms of availability ,(WASREB ,2016).

## **2.4 Empirical Literature Review**

This section reviews literature on the past studies in relation to the study objectives. The review was helpful in identifying research gaps.

### **2.4.1 Relationship between Quality Management System and Access to Water and Sanitation Services**

Psomas and Kafetzopoulos (2012) carried out in ISO certified and non-certified manufacturing firms in Greece. The study findings found out that ISO certified manufacturing firms significantly outperformed the non-certified ones with regard to product quality, firm performance, operational, market and financial performance. The study used a comparative analysis and it was done in a developed country. The current study focused on firms that had already implemented the quality management system and it was carried out in a developing country, Kenya.

Psomas, Pantouvakis and Kafetzopoulos (2012) carried out a study on the effect of Quality Management Practices on operational performance of service industries in Greece. The variables used were continuous improvement, firm's performance and prevention of non-conformities and financial performance as a mediating variable. The study used a sample of 100 ISO certified service firms. Data were obtained from quality managers using a structured questionnaire. Multiple linear regressions were used to analyze the study hypothesis. The findings revealed that the product quality and operational performance of the service firms are positively and significantly influenced by ISO's effectiveness. This study was done on a service sector, whereas

the current study was based in the water sector and used strategy formulation as a moderating variable.

Kagumba and Gongera (2013) conducted a study to establish the effectiveness of ISO certification on firm performance, employee productivity, inflow of revenue and internal procedures and processes in Kenyatta University. The study established that appreciation and participation in ISO certification resulted in improved firm performance, improved organizational outcomes and, accordingly, increased revenue inflows for development. However, the study did not consider how strategy formulation can moderate this relationship which the current study investigated.

Anyango, Wanjau and Mageto (2010) in their study noted that financial resource management, firm performance and non-conformance are major contributors of organizational performance. The study adopted a descriptive survey design and self-administered questionnaires. Data were analyzed using descriptive statistics. Pearson Correlation Coefficient was used to establish the significance of the relationship between quality management practices and performance. The study established that quality management practices influenced positively the financial resource management and firm performance. However, the study did not consider how strategy formulation can moderate this relationship which the current study took into consideration.

Mungula (2013) undertook a study on effect of quality management system on the organization performance in Tanzania. The study used a descriptive survey research design and a sample size of 40 respondents who were selected using the simple random sampling technique. Data was collected by the use of questionnaires. The study found out that the quality and quantity of the organizations that had implemented quality management system had significantly improved. To

fill the geographical gap, the current study was based in the water sector in Kenya and contextually, included the strategy formulation as a study variable.

Matata (2015) undertook a study on the effect of quality management system on the performance of Kenya Ports Authority. A sample of 116 respondents from a population of 7,500 personnel was picked from randomly selected departments. Questionnaires, observations and interviews were used to collect data. The study found out that there is a significant positive impact on the performance of the organization through improved service delivery, quality production; hence, giving the organization a competitive edge in the market. The current study filled the methodological gap by using a combination of descriptive research design and explanatory research design. The study also used the secondary and primary data for the purpose of drawing conclusions. Contextually, the study included the strategy formulation as a study variable.

Ikay and Aslan (2011) carried out a study in 255 SMEs in Turkey that investigated the difference between ISO-certified and non-certified firms on performance. Questionnaires were administered to SME representatives. The differences between certified and non-certified firms in terms of performance and quality practices were examined by one-way analysis of variance. The results showed no statistically significant difference between certified and noncertified firms in terms of performance. Certification showed no direct effect on performance. The current study used regression analysis to analyze the data thus addressing the methodology gap and established the moderating influence of strategy formulation on the relationship between quality management system and access to water and sanitation services in Kenya.



Studies done by Psomas and Kafetzopoulos (2012); Kagumba and Gongera (2013); Anyango, Wanjau and Mageto (2010); Mungula (2013); Matata (2015) and Ikay and Aslan (2011) are similar in the sense that they investigated the influence of quality management system on organizations performance. The findings of Ikay and Aslan (2011) found out that there is no statistically significant difference between certified and noncertified firms in terms of performance while Kafetzopoulos (2012); Kagumba and Gongera (2013); Anyango, Wanjau and Mageto (2010); Mungula (2013); Matata (2015) found that quality management system leads to increased customer satisfaction, increased profits and reduced wastes. However none of these studies investigated how quality management system can enhance access to water and sanitation services.

#### **2.4.1.1 Quality Management System Standards on Infrastructure and Access to Water and Sanitation Services**

Asante (2010) conducted a study on quantifying the cost of sustainable water services in selected small towns in the central region of Ghana. Time series data was collected from secondary sources by reviewing project completion reports between 1998 and 2008. The study found a significant relationship between infrastructure and sustainable water service delivery in rural water sector in Ghana. For the purposes of this study, descriptive research design was adopted. The current study further filled the methodological gap by using both primary and secondary data. Contextually, the study explored quality management infrastructure standards and access to water and sanitation services in place for sustainable water services in Kenya.

VonDach in 2007 conducted a study on the process of improving access to water and sanitation services in Kenya. The study obtained data by the use of questionnaires. The study found that the preliminary experience in Kenya towards improving access to water and sanitation services in

Kenya was positive, but slow. The study noted that the financial base and ability to carry out infrastructural development were inadequate and, therefore, the need to focus on these for the success of this endeavor. The study recommended an optimal integration of water resource management in the country so that all citizens can have adequate water. The current study filled the methodological gap by collecting data by the use of both the secondary sources and primary sources. Contextually, explore other efforts of improving access to water and sanitation services such as strategy formulation and the quality management system were included.

Studies done by Asante (2010) and VonDach (2007) are similar in the sense that they addressed the importance of water resource infrastructure in improving the access to water and sanitation services. These studies recommended the need for increased governments' investment in the existing structures infrastructure. However, the studies were different in the sense that Asante (2010) attempted to quantify the cost of sustainable water services, while VonDach (2007) assessed how investing on water and sanitation infrastructure can help improve the access to water and sanitation services. Asante's study in 2010 was based on selected towns in Ghana. The findings cannot, therefore, be generalized to other parts of the world. These studies, however, did not address how the level of adherence to QMS infrastructural development standards and has influenced the access to water and sanitation services in Kenya. These are the issues that the current study sought to address.

#### **2.4.1.2 Quality Management System Standards on Employee Skills and access to Water and sanitation services**

.Sikalaba, Mckenzie and Wegelin (2012) study on the role of training and capacity building in the implementation of water demand management in South Africa, adopted 49 schools, 4 water

demand management and sanitation projects and 35,250 households. The study found out that the key challenge in the water service providers was the development of skills and the integration of community education, and concentrated on the skills of the consumers leaving out the water service providers' employees, a gap that this study sought to fill. Contextually, the current study incorporated the quality management system standards and strategy formulation as study variables.

Dearden, Reed and Reenen (2005) carried out a study on the impact of training on productivity and wages. The study used a panel of British industries. The findings of the study were analyzed using economic estimation techniques. The study found out that training is associated with significantly high productivity. The current studies filled the methodological gap by using a combination of descriptive research design and an explanatory research design and used both the secondary and primary data for the purpose of drawing its conclusions. Contextually, the study assessed the access to water and sanitation services in Kenya in place of productivity.

Savery and Luks (2004) carried out a study on impact of training on organizational outcomes in Australia. Panels of 3,867 firms were used in the study. The study used a longitudinal research design where measurements were made over a period of four years. The study found out that firms regarded training as an important precursor for improved productivity. However, this study did not address how adherence to quality management system standards on employees' skills can enhance access to water and sanitation services. Further, to fill the geographical gap, the current study was carried out in the water sector in Kenya.

Salleh, Yaakuub and Dzulkifli (2011) study on the influence of skills levels on job performance of public service employees in Malaysia, adopted a correlation analysis on a sample of 150

government employees. The study revealed that skills level of employees have no effect on their performance. However, the study did not address how adherence to quality management system standards on employees' skills can enhance access to water and sanitation services. The current study filled the methodological gap by using a correlational research design. In addition, the current study used the secondary and primary data. Further, to fill the geographical gap, the current study was carried out in the water sector in Kenya.

The studies done by Dearden, Reed and Reenen (2005) and Savery and Luks (2004) are similar in the sense that they assessed the effects of employees' skills on organization performance. These studies differed in the sense that Dearden, Reed and Reenen (2005) carried out a study on impact of training on productivity and wages, while Savery and Luks (2004) assessed the impact of training on the organization outcomes. Savery and Luks (2004) assessed the impact of training on productivity, but failed to explore its impact on the access to water and sanitation services. These studies failed to address how the level of adherence to the QMS standards on employee's skills and strategy formulation have influenced the access to water and sanitation services in Kenya, which this study sought to address.

#### **2.4.1.3 Quality Management System Standards on Operational Efficiency and Access to Water and Sanitation Services**

Bichanga (2013) carried out a study on the factors influencing financial viability of water service providers in Kenya. The study used a case study research design and relied on secondary data from the water service providers. Data was analyzed using descriptive statistics. The study found out that operational inefficiency in the water service providers contributed to limited water access. The current study filled the methodological gap by the use of a combination of descriptive

research design and explanatory research design. The study also used both the secondary and primary data for the purpose of drawing its conclusions. Contextually, the study included other variables such quality management system and strategy formulation.

Mosha (2014) carried out a research on effects of water pipe bursts on water quality and non-revenue water in Arusha city. The study used a case study research design and found out that non-revenue water at Arusha Urban water and sanitation authority stood at 41% while the government was struggling to reach at 20% and below. The study found out that this was as a result of illegal connections, leakages from the water system and corruption and bribery. The study also found that this had a negative effect on profitability. The current study filled the methodological gap by using a combination of descriptive research design and explanatory research design. The study also used secondary and primary data for the purpose of drawing its conclusions. Contextually, the study related non-revenue water QMS standards and access to water and sanitation services in Kenya in place of profitably.

Kayanga and Njiru (2007) undertook a study on the improvement of water service providers' management in Kenya. The study was based in Kisumu Water and Sewerage Company (KIWASCO). The study used a case study research design and found out that bloated staff was a major course of operational inefficiencies which impacted negatively on the performance of the water and sanitation sector. The current study filled the methodological gap by using a combination of descriptive research design and explanatory research design.

Kangangi (2015) undertook a study on determinant of non-revenue water in water services provision in Kirinyaga County in Kenya. The study used a descriptive survey research design. The study used a sample of 97 members of staff of Kirinyaga Water and Sewerage Company.

Questionnaires were used to collect data. Descriptive statistics were used to analyze the data. The study found out that non-revenue water was as a result of non-detected leakages, pipe bursts, illegal connections, faulty meters and meter by passes. The research recommended that if adaptation of meter installation policy and aged consumer meters are replaced, water losses would be reduced by 61.1%. However, this study did not address how adherence to quality management system standards on non-revenue water can enhance access to water and sanitation services. The current study filled the methodological gap by using a combination of descriptive research design and explanatory research design and used both the secondary and primary data. Further, to fill the geographical gap the current study was carried out in selected water service providers in Kenya.

Studies done by Bichanga (2013), Mosha (2014), Kayanga and Njiru (2007) and Kangangi (2015) are similar in the sense that they assessed the influence of operational inefficiencies on the performance of the water and sanitation sector. These studies are, however, different in the sense that Mosha (2014) and Kangangi (2015) looked at the operational inefficiencies in terms of non-revenue water while Mosha (2014) looked at these inefficiencies in terms of employees' productivity. These studies did not address how the level of adherence to QMS standards on operation efficiency and strategy formulation has impacted on access to water and sanitation services in Kenya, which this study will sought to address.

#### **2.4.3 Strategy Formulation and Access to Water and Sanitation Services**

There is a view that there is need for consistency of an organization's strategic directions and the quality management system. A mature quality management system should include innovative directions of intervention from the early phases of their planning and designing processes. This is

likely to result to the expected outcome (Magd, 2008). In this study, the expected outcome is seen as improved access to water and sanitation services.

Ujunwa and Modebe (2012) carried out study on the adoption of strategic management approach in the capital market development in Nigeria. The study used a case study research design. The study found out that strategic management approach ensured capital market efficiency following its perceived pivotal role in economic development. The study noted that strategy formulation did not only promote the efficiency of the capital market, but will leverage its role in promoting economic growth. This study assessed the leveraging role strategy formulation on the performance of capital markets in terms of its efficiency and economic growth. However, this study did not address how strategy formulation supplements the quality management systems in the water sector. Further, the current study filled the methodological gap by adopting descriptive cross sectional research design.

Askarany and Yazdifar (2012) investigated the diffusion of strategic management tools. The study used a survey research design. The study examined the relationship between the adoption of strategic management tools and organizational performance in both manufacturing and non-manufacturing organizations in New Zealand. The study found out that there is a significant association between the diffusion of strategic management tools and organizational performance. Contextually, the current study incorporated the quality management system as a study variable.

Muogbo (2013) carried out a study on the effect of formal strategic management on organizational growth and development in 21 selected firms in Nigeria. Data was collected from 63 respondents and analyzed using descriptive statistics. Hypotheses were tested using Chi-square. The study found out application of formal strategic management was not common in

many organizations. The study also found thatout that application of formal strategic management had a significant effect on the firms' competitiveness. However, this study did not address how strategy formulation can supplement the quality management system in enhancing access to water and sanitation services. Further, to fill the geographical gap, the current study was carried out in Kenya.

Njiru and Wario, (2014) carried out a study on implementation of strategic management practices in the water and sanitation services in Kenya. The study used a survey research design. The study found out that implementation of strategic management practices is positive allowing organizations to increase profit when accommodating customers' needs. However, this study did not address how strategy formulation can supplement the quality management system in enhancing access to water and sanitation services.

Studies done by Ujunwa and Modebe (2012), Askarany and Yazdifar (2012) and Muogbo (2013) are similar in the sense that they assessed the influence of strategic management on the organizational performance and competitiveness. However, the studies are different in the sense that while Ujunwa and Modebe (2012) used a case study research design, Askarany and Yazdifar (2012) and Muogbo (2013) used a survey research design. However, these studies did not seek to establish how strategy formulation influence the level of access to water and sanitation services.

#### **2.4.4 Moderating Influence of Strategy Formulation on the Relationship between Quality Management System and Access to Water and Sanitation Services**

The third objective was to establish the moderating influence of strategy formulation on the in relation to this objective relationship between quality management system and access to water and sanitation services. Several past studies were reviewed in order to help in gap identification.



Seedee (2012) carried out a study on moderating role of business strategies on the relationship between best business practices and firm performance. Data were collected from 169 Thai manufacturing firms. Descriptive statistics and hierarchical regression analysis were used to analyze the data. The finding indicated that the relationship between best business practices and firm's performance could be influenced by business strategies. Though this study assessed the moderating influence of business strategies, it did not address how they influence the relationship between quality management system and access to water and sanitation services in Kenya.

Sagwa, K'Obonyo, Ogutu (2015) conducted a study on moderating effect of competitive strategy on the relationship between employee outcomes and performance of firms listed on the Nairobi Securities Exchange. The study used cross sectional descriptive survey research design. Data were collected using a self-administered questionnaire, from a population of 60(100%) Nairobi Securities Exchange listed firms. Descriptive statistics, correlation and regression techniques were used to analyze the data. The results indicate that competitive strategy moderates the relationship between employee outcomes and firm performance. The current study concentrated on strategy formulation as opposed to one single strategy.

Rosli & Rosman Mahmood (2013) carried out a study on moderating effects of human resource management practices and entrepreneur training on innovation and small-medium firm Performance. Two hundred eighty-four samples were obtained from small-medium firms in Malaysia. The study found that the employee training interacted with innovation and significantly influenced organization performance. . The current study incorporated all other functions of management beyond human resource management practices.

Seedee (2012), Sagwa, K'Obonyo & Ogutu (2015) and Rosli & Mahmood (2013) studies were similar in the sense that they assessed the moderating influence of business strategies, competitive strategy and human resource management practices. These studies were different in the sense that they concentrated on specific strategies. Previous studies on relationship between strategy formulation and organization performance used strategy formulation as an independent variable thus they did not address the moderating role of strategy formulation on the relationship between adherence to quality management system standards and access to water and the sanitation services. A moderating variable is introduced when we are expecting the model is a contextual one but when the third variable appears the existing relationship changes the direction, strengthens or weakens the relation, Baron and Kenny (1986). In order to achieve the true value associated with quality management system, it should be aligned with the organization's strategic direction (Magd, 2008). This suggested that a moderating variable like the strategy formulation can have a strong influence on the strength and direction of the relationship between the level of adherence to quality management system standards and access to water and sanitation services. This moderating role of strategy formulation warranted an investigation.

## **2.5 Summary**

The literature reviewed in this study presents a comprehensive coverage of how organizations have tried to initiate programs of ensuring quality services to their customers. The literature has revealed that access to water and sanitation services can help in the reduction of the level of poverty. Previous studies have revealed the unsuccessful attempts to improve access of water and sanitation services through privatization and structural reforms in the water sector. Prior studies have sought to establish the effect of quality management system on organization

performance these research findings has given mixed results, other studies sought to establish the effect of water resource infrastructure, employees' skills and operating efficiently on organization performance. These studies are in agreement that all these factors affect service delivery. Other studies sought to establish the effect of strategic management on organization performance. However, none of these studies addressed how strategy formulation can supplement the quality management system in enhancing the access to water and sanitation services in Kenya. .

## **CHAPTER THREE: METHODOLOGY**

In this chapter, the methodology for the study on the moderating influence of strategy formulation on the relationship between quality management system and access to water and sanitation services is presented. This chapter spells out how the study was conducted. First, the research paradigm is presented. This section also explains research design adopted. The study area, target population, sample size and sample procedure are discussed respectively. The data collection methods, sources of data, data collection procedure and data collection instruments are as well discussed. Validity and reliability of the research instruments are also discussed. The methods of data analysis and presentation based on each objective and how hypotheses were tested are presented, finally test for statistical assumptions, analysis of Likert type data, and ethical considerations are presented.

### **3.1 Research Paradigm**

This study adopted a pragmatic research paradigm. The research paradigm influences the way knowledge is studied and interpreted. Its choice sets down the intent, motivation and expectations for the research (Mertens, 2005). Pragmatic research paradigm argues that knowledge arises from actions, situations, and consequences rather than antecedent conditions (Creswell, 2012). The concern in this paradigm is the applications of what works and solutions to problems. Instead of methods being the first priority, the problem is most important, and the researcher uses all approaches to understand the problem. This research paradigm gave the researcher the freedom to choose the methods, techniques, and procedures of research that best meet the needs and purpose of the study. According to Morgan (2007) and Patton (2002), it allows focusing attention on the research problem in social science research and then using pluralistic approaches to derive knowledge about the problem. Pragmatism also provides a good

philosophical basis for social science research since it is not committed to any one system of philosophy and reality as it's the case of positivisms. This philosophy allowed the study to use both quantitative and qualitative methods of inquiry because of the nature of the constructs that were being investigated required interpretations to be derived from the subjects of the study in order to gain deeper and wider understanding. In this study quantitative data was obtained from the data submitted to WASREB by the water service providers during 2016/2017 financial year and from the structured questions in the questionnaires administered to the general managers of the water service providers. Therefore, both constructivist and positivist perspectives were applied in the study. This study aimed at deriving benefits from combining different knowledge systems (Olsson, Folke, and Berkes, 2004). Pragmatic paradigm helped in understanding how the relationship between quality management system and access to water and sanitation services is moderated by strategy formulation.

### **3.1.1 Research Design**

A research design is a master plan that specifies the methods and procedures for collecting and analyzing the needed information (Sekaran & Roger, 2009). According to Cooper and Schindler (2006), a research design constitutes the blue print for the collection, measurement and analysis of the data to achieve the objectives of the study. In designing a research, scholars are guided by issues such as the type of data being collected, method of data collection and the purpose of study. According to Tuli (2012), the selection of research methodology should depend on the research paradigm, in this case the pragmatism research paradigm.

There is no single design that exists in isolation (Saunders *et al.*, 2007), therefore, combining different designs in one study enables triangulation and increases validity of the findings. Mingers (2001) supported simultaneous triangulation approach, where the objective is

to use both qualitative and quantitative data to develop a deeper understanding of the issue of interest.

This study there for obtained quantitative data from WASREB reports and the structures questions in the questionnaire. The study employed Correlational research design to explain the moderating influence of strategy formulation on the relationship between quality management system and access to water and sanitation services in Kenya.

According to Mugenda and Mugenda (2006), descriptive research design is preferable, as it tries to answer the questions who, what, when, where and sometimes how. It also enables researchers to summarize and organize the data in an effective and meaningful manner. According to Eriksson and Kovalainen (2008), descriptive research involves producing data that is holistic, contextual and one that is rich in details to test hypothesis or answer questions concerning the current status of the subject of the research. In this study it help in establishing the level of adherence to infrastructure standards, the level of adherence to employees skills standards, the level of adherence to operational efficiency standards, the level of application of strategy formulation in the water service providers and level of access to water and sanitation services in Kenya.

Correlational research design attempts to clarify why, how and if there exists a relationship between two or more characteristics of a phenomenon. The Correlational research design explains best the characteristics of variables and how to establish cause-and-effect relationship between variables (Saunders *et al.*, 2007). The emphasis in this study was studying a problem with the aim of explaining the relationship between variables. In this study Correlational research design helped to establish the relationship between the level of adherence to infrastructure

standards and access to water and sanitation service , the relationship between the level of adherence to employees skills standards and access to water and sanitation service ,the relationship between the level of adherence to operational efficiency standards and access to water and sanitation service ,and the moderating influence of strategy formulation on the relationship between the quality management system standards and access to water and sanitation service in Kenya.

### **3.2 The Study Area**

This study was based in the 91 water service providers in Kenya. Kenya lies within latitude 1<sup>0</sup> 00'' North of equator and longitude 38<sup>0</sup> 00'' East of Greenwich meridian. Her geographical area is 569,251 square kilometers. Kenya has an estimated population of 45.5 million and her population density is 78.5 people per square kilometer. Kenya is a third world country with an estimated gross domestic product (GDP) of 54,443 million Kshs. Kenya employment level of labour force is estimated at 9.3 per cent (World Statistics Pocketbook, 2014). Kenya is mainly an agricultural country with an expanding economy whose basic element for development is water. Water is required for agricultural, commercial and domestic use (Mogaka et al., 2006). However, the climate in Kenya varies by region and season to an extent that whereas some parts of the country would be experiencing floods, others will hardly receive a drop in a year. This makes accessibility to clean water unreliable in Kenya even to the areas where rainfall is abundant. The country has a mean annual rainfall of about 500 mm, which varies from between 250mm in the arid and semi-arid areas to 2,000 mm in the high mountain eco-systems. About 66% of the country receives less than 500 mm of rainfall.

### **3.3 The Target Population**

Cooper and Schindler (2006) define population as the collection of elements about which we wish to make reference to. Kothari (2004) refers to population as a group of people, events or things of interest. The study population in this study comprised of the 86 water service providers which submitted data to WASREB in 2016/2017 financial year in Kenya. These water service providers' fall under the eight water service boards which include Tana, Northern, Athi, Lake Victoria, Rift Valley, Lake Victoria South, TanaAthi and Coast.

### **3.4 Sample Size**

According to Gay (1976), the approach where the population is equal to the sample is known as a census survey. The 86 managers of the water service providers thus constitute the respondents, from which 10 general managers of the randomly selected water providers participated in pilot study and were excluded from the main study. Water service providers were classified on the bases of the size for fair inclusion in the sample categorization. The number of connections is relevant because it has a direct correlation with the financial sustainability and human resource capacity of the water service providers, Impact Report (2016). Table 3.1 summarizes this information



**Table 3.1 Categories of Water Service Providers**

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<b>Utility Category</b>	<b>Total (N)</b>
<b>Per Number of Connections</b>	
Small(<5000)	31
Medium(5,000-9,999)	19
Large(10,000-34,999)	28
Very large( $\geq$ 35,000 )	8
Total	86

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Source: Impact Report, (2016).

Questionnaires were distributed to the general managers of 76 water service providers; the initial returned questionnaires were 49, to mitigate this low response rate a second visit was made to encourage respondents to return questionnaires in a second wave (Peress, 2010). In total 54 general managers gave complete responses. This represented a response rate of 71.05 % which was good enough as indicated by Sekaran (2003) who asserted that a response rate of 70% or higher is acceptable in social science research.

### **3.5 Data Collection Methods**

This section presents the data sources, the data collection procedure, data collection instruments used and how the reliability and the validity of the instruments were tested.

#### **3.5.1 Sources of Data**

Primary data were collected by the use questionnaires. Questionnaires consisted of both open ended and structured questions. The respondents of the study consisted of the general managers of the water service providers. This is because they are the process owners in the quality management system and they are the formulators of the strategic plans of the organization. This made them informative on issues related to level of adherence to QMS standards and the strategy formulation. Secondary data were obtained from the 2016 /2017 WASREB report. Information used for performance analysis is collected through the Water Regulation Information System (WARIS). Through the system, the WASREB makes requests for data submission from the water service providers and WSBs. The data undergoes a verification process within the water service providers and WSBs. Thereafter, all the data is submitted to the WASREB for review and approval.

#### **3. 5.2 Data Collection Procedures**

A number of steps were followed in collecting the actual data. First, the questionnaires were cross checked to ensure that they contain what the objectives intended to achieve. This step was followed by subjecting these instruments to a pilot run. Feedback from the pilot study was used to adjust the questionnaires to the intended standard. According to Murray (2003), piloting is important because it helped to identify ambiguities of the items and vague questions for improvement.

### **3.5.3 Data Collection Instruments**

Secondary data were obtained through documentary analysis. This involved capturing the data that was submitted to the WASREB during the 2016 /2017 financial year. Primary data were collected by the use of open ended and structured questionnaires. Questionnaires were used to gather both qualitative and quantitative data from the respondents. A questionnaire is a set of questions or statements that assesses attitudes, opinions, beliefs and biographical information (McMillan & Schumacher, 2001). A questionnaire was used to collect data relating to the influence of strategy formulation on the relationship between quality management systems and access to water and sanitation services from the general managers of the selected water service providers. Questionnaires are an effective method of collecting data especially on large number of respondents and can easily be analyzed (Cooper & Schindler, 2006). Since a large quantity of data was required, the questionnaire was found to be suitable for this study.

### **3.5.4 Reliability of Instruments**

Reliability refers to the consistence of measurement or the extent to which the results are similar over different forms of the same instrument or occasions of data collection and the extent to which measures are free from errors (McMillan & Schumacher, 2001). According to Orodho(2005), reliability of an instrument concerns the degree to which a particular instrument can consistently yield a similar result over a number of repeated trials.

The developed questionnaires were administered to the general managers of the ten randomly selected water service providers twice at an interval of one week. This represented at least 10% of each category of the parent sample which is sufficient for a pilot study (Connelly, 2008). Pre-testing of the tools was undertaken to test whether the questions are clear and can be easily understood. This ensured that the questions and issues regarding the subject of the study are

included in the questionnaires and clear from any ambiguities. The pretest helped in identifying the exact numbers of enumerators required, number of days and also in estimating the cost. Those pilot tested were excluded from the study to avoid the sensitization effect (Mugenda&Mugenda, 2013).The internal consistency of the instrument was determined via Cronbach's coefficient alpha (Cronbach, 1951).Ideally, the Cronbach alpha coefficient of a scale should be above 0 .70. Pre-testing is the administration of the data collection instrument with a small set of respondents from the population before the full scale survey (Fraenkel&Wallen, 2001). The internal consistency of the questions was determined via Cronbach's coefficient alpha

(Cronbach, 1951):  $\alpha = \frac{k}{(k-1)} \left(1 - \frac{S(s^2 i)}{(s^2 sum)}\right)$  where:

- k = the number of individual questions;
- $s^2 i$  = the variances for all the individual questions, and
- $s^2 sum$  = the variance for the sum of all the questions.

Ideally, the Cronbach's alpha coefficient of a scale should be above 0.70. Cronbach's alpha was run to test for the reliability of the research instrument using Likert scaled variables. The research instrument was found reliable (Cronbach's alpha = 0.773, number of items = 7). The Cronbach's alpha was greater than the rule of thumb of 0.7 showing a reliable instrument whose results also indicated high validity as described in section of test for validity. These were within the minimum accepted reliability as suggested by Sekaran (2003) and Pallant (2012).

**Table 3.2 Cronbach's Alpha**

<b>Cronbach's Alpha</b>	<b>Internal Consistency</b>
$a \geq 0.9$	Excellent
$0.7 \leq a < 0.9$	Good
$0.6 \leq a < 0.7$	Acceptable
$0.5 \leq a < 0.6$	Poor
$a < 0.5$	Unacceptable

Source: Cronbach, 1951

### **3.5.5 Validity of Instruments**

There are two types of validity that are established in a study, namely: the internal and external validity. A research study has internal validity if the outcome is dependent upon the variables specifically under study. A research study, therefore, has internal validity if the outcome is dependent upon the variables specifically under study (Weirisma, 1980). According to Gay (1997), content validity is established by an expert. A measure has content validity if there is a general agreement among the subjects and researcher that the instrument has measurement items that cover all aspects of the variable being measured (Ojera, 2011). This form of validity subjectively assesses the correspondence between the individual items and the concept through rating by expert judges. The designed instruments were therefore counter checked by the two experts in strategic management. The content validity index (CVI) was then calculated.

According to Waltz, Strickland, and Lenz (2005), the CVI is defined as the proportion of items given a rating of quite/very relevant by both raters involved or the proportion of items given a

rating of 3 or 4 by both raters involved. According to this definition, both judges have to agree that any individual item is relevant in order for it to count towards the CVI. In this study, 25 out of 30 items were judged to be quite or highly relevant (a ratings of 1= not relevant; 2 = somewhat relevant; 3 = quite relevant and; 4 = highly relevant) by both experts, and so the CVI was computed to be 0.833 as shown in figure 5. Researchers have indicated that a CVI of 0.70 or higher is acceptable (Oso, 2013; Waltz, Strickland, & Lenz, 2005). The CVI for this study was 83.3%.

**Table 3.3 Computation of CVI for a 30-Item Scale with Two Expert Raters**

		Expert Rater 2		
Expert Rater 1		Items rated 1 and 2	Items Rated 3 and 4	Totals
	Items rated 1 and 2	5	0	5
	Items Rated 3 and 4	0	25	25
	Totals	5	25	30

$$\text{CVI} = 25/30 = .833$$

Source: Data 2017

### **3.6 Data Analysis and Presentation Techniques**

This study collected and analyzed the quantitative data. The analysis began with coding and data entry into the analysis package that facilitated analysis and deduction, in this case, the SPSS version 21 was used. Data was explored for normality and multicollinearity to decide on the probable statistical tool to be used. To establish the relationship between the

independent variables and the dependent variable the study used simple regression models because the dependent variable which is the access to water and sanitation services is continuous, as recommended by Muthen and Muthen (2007). Multiple linear regression models were run to establish the moderating effect of strategy formulation on the relationship between quality management system and access to water and sanitation services using step-by-step method (Field, 2009). The models were presented using linear equations. According to Lucky (2012), multiple regression analysis is a useful tool for examining the impact of multiple factors on a single outcome of interest. This model gives better prediction from multiple predictors, avoid depending on a single predictor and non-optimal combinations of predictors. Multiple regression models allow the examination of more sophisticated research hypotheses than is possible using simple correlations (Goldstein, 1995).

Since most of the assumptions for parametric tests were met, the study utilized both descriptive and inferential statistics to enable parametric analysis. Whereas descriptive statistics involved the use of central tendency (mean, mode and median), standard deviation and variance; the inferential tests employed the use of Pearson correlation ( $r$ ) and regression analysis to test the relationships between the study variables.

### **3.6.1. Analysis of level of adherence to quality management system Standards in Water Services providers**

The research sought to establish the level of adherence to quality management system standards in terms of infrastructure standards, employee's skills standards and operation efficiency standards. The mean of each item was computed to assess the extent to which the water service provider adheres to the specific standards after which the mean of means was computed to get the level of adherence to quality management system standards of the water service

providers. The mean of means measured the extent to which the water service provider adheres to the quality management system standards.

### **3.6.2. Analysis of Influence Quality Management System Standards on Access to Water and Sanitation Services**

The study sought to establish the influence of quality management system standards on access to water and sanitation services. Quality management system standards were measured in terms of level of adherence to infrastructure standards, employees' skills standards and operation efficiency standards. Access to water and sanitation service was measured in terms of area coverage, number of connections, hours of supply and quality of drinking water. This is expressed in the following equation.

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \dots \dots \dots \text{Equation 3.1}$$

Where

$Y_i$ - Access to water and sanitation services

$\beta_0$ = intercept

$\beta_3$  = Regression coefficients shows the change in the value of  $Y_i$  from a unit change in  $X_i$

$X_i$ - level of adherence to QMS standards

$\varepsilon_i$  = Random error

#### **3.6.2.1 Analysis of Influence of QMS Infrastructure Standards on Access to Water and Sanitation Services**

The study sought to establish the influence of level of adherence to QMS infrastructure standards on access to water and sanitation services. Access to water and sanitation services was measured



in terms of area coverage, hours of supply and quality of drinking water. Level of adherence to QMS infrastructure standards was measured in terms of level of adherence to production capacity, number of connections, sewerage and storage capacity standards. This is expressed in the following equation.

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \dots \dots \dots \text{Equation 3.2}$$

Where

$Y_i$ - Access to water and sanitation services

$\beta_0$  = The intercept

$\beta_1$  = Regression coefficients shows the change in the value of  $Y_i$  from a unit change in  $X_i$

$X_i$ - level of adherence to infrastructure standards

$\varepsilon_i$  = random error

**3.6.2.2 Analysis of Influence of Level of Adherence to QMS Employees Skills Standards and Access to Water and Sanitation Services**

The study sought to establish the influence of level of adherence to employees' skills standards and access to water and sanitation services. Adherence to employees' skills standards were measured in terms of level of adherence to academic qualification, work experience and training and development programs standards in the water service providers'. Access to water and sanitation service was measured in terms area coverage, hours of supply and quality of drinking water. This is expressed in the following equation

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \dots \dots \dots \text{Equation 3.3}$$

Where

$Y_i$ - Access to water and sanitation services

$\beta_0$  = The intercept

$\beta_1$ = Regression coefficients shows the change in the value of  $Y_i$  from a unit change in  $X_i$

$X_i$ - level of adherence to employees' skills standards

$\epsilon_i$  = random error

### **3.6.2.3 Analysis of Influence of Level of Adherence to QMS Operation Standards on Access to Water and Sanitation Services**

The study sought to establish the influence of level of adherence to QMS operation efficiency standards on access to water and sanitation services. Adherence to QMS operation efficiency standards was measured in terms of level of adherence to none revenue water,labour productivityand revenue collection efficiency standards. Access to water and sanitation service was measured in terms of area coverage, number of connections, hours of supply and quality of drinking water. This isexpressed in the following equation.

$$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i \dots \dots \dots \text{Equation 3.4}$$

Where

$Y_i$ - Access to water and sanitation services

$\beta_0$  = The intercept

$\beta_1$  = Regression coefficients shows the change in the value of  $Y_i$  from a unit change in  $X_i$

$X_i$ - Level of adherence to QMS operational efficiency standards

$\varepsilon_i$  = Random error

### 3.6.3 Analysis of Influence of Strategy Formulation on Access to Water and Sanitation Services

The study sought to establish the influence of strategy formulation on access to water and sanitation services. Application of strategy formulation were measured in term of use of well-structured planning mechanism, having a well written mission and vision ,basing decisions and actions on formulated organization policies and use of resource control teams. Access to water and sanitation service was measured in terms of area coverage, number of connections, hours of supply and quality of drinking water. This is expressed in the following equation.

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \dots \dots \dots \text{Equation 3.5}$$

Where

$Y_i$ - Access to water and sanitation services

$\beta_0$  = The intercept

$\beta_1$  = Regression coefficients shows the change in the value of  $Y_i$  from a unit change in  $X_i$

$X_i$ - Application of strategy formulation

$\varepsilon_i$  = Random error

### **3.6.4 Analysis of Moderating Influence of Strategy formulation on the Relationship between Level of Adherence to QMS Standards and Access to Water and Sanitation Services**

The study sought to establish the moderating influence of strategy formulation on the relationship between level of adherence to QMS standards and access to water and sanitation services. Adherence to quality management standards were measured in terms of level of adherence to infrastructure standards, employees' skills standards and operational efficiency standards.

To establish the level of adherence to infrastructure standards respondents were requested to answer a set of twelve questions. These questions were organized into four sub sections, each corresponding to the key infrastructures of the water service providers which included production infrastructure, connection, storage and sewerage infrastructure, WASREB (2014). Each area contained three items that examined the level of adherence to these standards. The items were presented in five point Likert type and respondents requested to give their opinion on the level of adherence to each infrastructure standards. The first set of items sought information on whether the infrastructure in the four area were in line with the QMS standards, the second set of items sought for information on whether the QMS audit had detected any non conformity on infrastructure development in the four areas while the third set of items sought information on whether the water service providers had adequately implemented the QMS requirements on infrastructure development in the four area

To establish the level of adherence to employees' skills standards respondents were requested to answer a set of nine questions. These questions were organized into three sub sections, each corresponding to the key determinants of employees' skills which included employee's academic qualifications, employees experience and training and development programs in the water

service providers. Each area contained three items that examined the level of adherence to these standards. The items were presented in five point Likert type and requested the respondents to give their opinion on the level of adherence to each employee's skills standards. The first set of item sought information on whether the employees skills were in line with the QMS standards for each of the three areas, the second set of items sought information on whether the QMS audit had detected any none conformity on employees skills on each of the three areas while the third setsought information on whether the water service providers had adequately implemented the QMS requirements on employees skills in the three areas

To establish the level of adherence to operational efficiency standards respondents were requested to answer a set of nine questions. These questions were organized into three sub sections, each corresponding to the key determinants of operational efficiency which included non- revenue water, labor productivity and revenue collection efficiency, Marin (2009). Each area contained three items that examined the level of adherence to these standards. The items were presented in five point Likert type and respondents were requested to give their opinion on the level of adherence to each operational efficiency standards. The first set of items sought information on whether the operational efficiency standards were in line with the QMS standards for each of the three areas, the second set of items sought for information on whether the QMS audit had detected any none conformity on operational efficiency on each of the three areas while the third sought information on whether the water service providers had adequately implemented the QMS requirements on operational efficiency in the three areas.

To establish the level of application of strategy formulation respondents were requested to answer a set of twelve questions. These questions were organized into four sub sections, each corresponding to the key elements of strategy formulation which included use of well-structured

planning mechanism, communicating the mission and vision to all stakeholders and basing decisions actions on formulated organization policies and use of resource control teams, (Marina 2015). Each area contained three items that examined the level of application of the strategy formulation. The items were presented in five point Likert type and the respondents were requested to give their opinion on the level of application of the strategy formulation. The first set of items sought information on whether the water service providers have well written mission and vision, whether all the stake holders understand the mission and vision and whether the organizations mission and vision are displayed in strategic places, the second set of items sought information on whether the water service providers have well developed plans, whether they use structured planning mechanisms and whether they adhere to their plan of activities while the third sought information on whether the water service providers have well formulated organization policies, whether they base decisions on the formulated policies and whether the members of the organization understand the organization policies. The fourth set of items sought to establish whether the organization had constituted resource control teams, whether the resource control teams had representation from all the departments and whether all the members of the resource control teams give suggestions on resource allocation.

To establish the level of access to water and sanitation services respondents were requested to answer a set of four questions. These questions covered the four areas that determine the level of access to water and sanitation services which include water and sewerage coverage, quality of drinking water and hours of water supply, (Asingo 2005). The items were presented in five point Likert type and respondents were requested to give their rating on the level of the access to water and sanitation services using the four measures. The first item sought information on respondents rating of the water coverage of the water service provider, the second sought for information on

respondents rating of the sewerage coverage of the water service provider third sought information on respondents rating of the quality of drinking water provided by the water service provider and the last question sought information on respondents rating of the hours of water supply per day to customers of the water service provider.

Data analysis was done in steps. Firstly, preliminary data analysis involved calculation of the mean and standard deviation for every questionnaire item, and then the mean of means and mean standard deviation for each study variables. This was followed running multiple regression models which were used to test the fourth hypothesis using the step by step approach.

### **3.7 Testing for moderation**

According to Baron and Kenny (1986) a moderating variable is a qualitative or quantitative variable that affect the direction or strength of the relation between a predictor variable and the criterion variable. In a correlational analysis context, a moderator is a third variable that affects the zero-order correlation between two other variables. In this case the strategy formulation was introduced as the moderating variable to assess how they influence the relationship between quality management system and access to water and sanitation services.

Another type of a variable is the mediating variable .A variable acts as a mediator in terms of the extent to which it accounts for the relation between the predictor and the outcome. Mediators explain how external physical events take on internal psychological significance. Moderating variables specify when certain effects will hold, mediating variable address how or why such effects occur, Baron and Kenny (1986). A moderator variable is one that influences the relationship between two other variables, and a mediator variable is one that explains the relationship between the two other variables. In this case strategy formulation was considered to

be a moderating variable since they are likely to affect the strength of the relationship between the quality management system and access to water and sanitation services.

In the analysis of variance, a basic moderator effect can be represented as an interaction between a focal independent variable and a factor that specifies the appropriate conditions for its operation, Baron and Kenny (1986). To establish the effect of strategy formulation as a moderating variable on the relationship between quality management system and access to water and sanitation services or determine whether it is simply an explanatory variable, the following steps wise regressions were estimated. First, Model (3.1) was estimated as the base model to determine the relationship between the quality management system and the access to water and sanitation services.

$$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i \dots \dots \dots \text{Equation 3.7}$$

$Y_i$  = Access to water and sanitation services

$X_i$  = Quality Management System

The implementation of quality management system was seen as a product of the level of adherence to infrastructure standards, level of adherence to employees' skills standards and level of adherence to operational efficiency standards.

Second, Equation (3.7) which included strategy formulation as the moderating variable was estimated.

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 Z_i + \epsilon_i \dots \dots \dots \text{Equation 3.8}$$

Where;



$Y_i$ = Access to water and sanitation services

$X_i$ = Quality Management System

$Z_i$ = Strategy Formulation

Finally, Model 3.8 was estimated to give the direction and effect of the strategy formulation (moderator) on the quality management system (Independent Variable) and its total effect on the access to water and sanitation services (Dependent Variable).

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 Z_i + \beta_3 X_i * Z_i + \varepsilon_i \dots \dots \dots \text{Equation 3.9}$$

Where,  $\beta_3 X_i * Z_i$ = Quality Management system \* strategy formulation (Interaction term). If strategy formulation were significant when introduced into Model (3.8), then it explains the first condition of explanatory where all variables should be significant (Mackinnon *et al.*, 2007). Model (3.9) was estimated where results of strategy formulation and quality management system were used to estimate the moderating effects. If the coefficients in Model (3.9) are not significant and strategy formulation in Model (3.10) is significant, there is no moderating effect. Thus, strategy formulation are just an explanatory variable.

**Table 3.4 Decision Making for Moderation**

Model 3.2	Model 3.2	Total effect	Conclusion
$\beta_1$ is not significant ( $p>0.05$ )		–	No overall effect to moderate
$\beta_1$ is not significant ( $p>0.05$ )	$\beta_2$ is not significant ( $p>0.05$ )	$\beta_3$	Moderating variable is an explanatory variable
$\beta_1$ is not significant ( $p>0.05$ )	$\beta_2$ is significant ( $p>0.05$ )	–	Moderating variable has a moderating variable

Source: Baron and Kenny (1986)

Table 3.4 indicates that in case moderation is significant, the coefficient ( $\beta_3$ ) of the interaction term (Quality Management system \* strategy formulation) in model 4.3 would yield the strength and direction of the moderating variable.

### 3.8 Hypothesis Testing

To establish the factors that can be used to predict the access to water and sanitation services, the study utilized regression analysis. The independent variables which are adherence to quality management system standard in terms of infrastructure standards, employees' skills standards and operational efficiency standards were first inter-correlated with the dependent variable which is the access to water and sanitation services. Multiple regression analysis using step wise approach was used to test the moderating influence of strategy formulation on the relationship between quality management system and access to water and sanitation services.

In order to correctly interpret the subsequent statistics, the following considerations were made. When:  $r = -1$  implied a perfect negative linear relationship,  $r = -0.70$  implied a strong negative linear relationship,  $r = -0.50$  meant a moderate negative relationship,  $r = -0.30$  indicated weak negative linear relationship,  $r = 0$  meant that there is no linear relationship, where  $r = +0.30$  meant a weak positive linear relationship,  $r = +0.50$  meant a moderate positive linear relationship,  $r = +0.70$  indicated a strong positive linear relationship and  $r = +1$  implied a perfect positive linear relationship. For  $t$ -value of greater than 1.96 with  $p$  less than 0.05 indicates that the independent variable is a significant predictor of the dependent variable. The greater the  $t$ -statistics, the greater the relative influence of the independent variable on the dependent variable. A  $t$ -statistics of less than 1.96 with  $p$  significance greater than .05 indicates that the independent variable is not a significant predictor of the dependent variable beyond the sample and Coefficient of Determination  $R^2 = 1$  meant a perfect fit and  $R^2 = 0$  implies no variation.

### **3.8 Tests for Statistical Assumptions and Analysis of Likert-Type Data**

Test for statistical assumptions and analysis are important to ensure that basic assumptions for parametric tests are observed. Assumptions for parametric tests include normality, homogeneity of variance, linearity and independence. This section discusses the significance of multicollinearity in regression analysis, methods of remedying multicollinearity situations and test results for multicollinearity analysis of the independent variables and the tests for normality. The section further discusses the use of Likert scale in data analysis.

#### **3.8.1 Tests for Multicollinearity**

Collinearity refers to a situation where at least two independent variables in a statistical model are linearly related such that the correlation coefficient ( $r$ ) is either greater or less than zero (Alin, 2010). Collinearity implies the non-independence of predictor variables, especially in

regression type analysis. Multicollinearity, exists when two or more independent variables are inter-correlated. In all studies, with an exception of certain designed experiments, the existence of collinearity or multicollinearity will always occur. What is of concern to scholars is not its presence but its influence on analysis (Baguley, 2012).

Pedace (2013) noted that multicollinearity will have a significant influence only when the correlation coefficient of the interacting predictor variables is equal to or greater than 0.7. Whereas multicollinearity has no influence on the overall regression model and associated statistics such as  $R^2$  and  $p$  values, or the general predictions made using the overall model, it is a problem if a scholar is interested in assessing the effects of individual predictor variables on the dependent variable when performing multiple regression, unless their degree is small or the sample size is very large (Gujarati and Porter, 2009; Baguley, 2012). When high multicollinearity occurs, the predictor variables tend to share substantial amounts of information and compete to explain a similar variance making it difficult to assess the effect of an individual variable on the dependent variable (Kutner *et al.*, 2005, Melounet *al.* 2002). Additionally, extrapolation is likely to be erroneous since the parameter estimates may be unstable and standard errors on estimates exaggerated leading to erroneous tests of significance for the predictor variables and prejudiced inferential statistics (Ohlemuller *et al.*, 2008; Wheeler 2007).

However, this may be remedied by either by doing away with one of the collinear variable (Gujarati and Porter, 2009), combining the highly correlated predictor variables into a single variable (Allison, 1999) or eliminating multicollinearity source variables (Zainodin *et al.*, 2011). It may also be overcome by detecting, quantifying and adjusting the regression coefficients for the effects of multicollinearity in a data base using principal components analysis technique

(Lafiand Kaneene, 1992) or by modifying the method of least squares to allow biased estimators of the regression coefficients to remedy the multicollinearity problem using ridge regression technique (Kutner *et al.* 2005).

Unless remedied, most statistical programmes will estimate the effect of an individual independent variable by holding the other correlated variable constant, ignoring the shared variance between them. This effectively reduces the variability of the predictor variable of interest and its influence, the effective amount of information available to assess the unique effects of the variable, the effective sample size for the effects of individual independent variables and the statistical power for estimating the individual independent variable (Baguley, 2012). In this study, pair-wise collinearity of the independent variable which is the quality management system standards which was broken down to specific standards which included infrastructure standards (IS), employee skills standards (ES) and operational efficiency standards (OE) was performed and the resultant correlation matrix is presented on Table 3.5.

**Table 3.5 Multicollinearity Matrix of Independent Variables**

	<b>Quality management system</b>	<b>Strategic Management practices</b>
<b>Quality management system</b>	1	0.225
<b>Strategy Implementation</b>	0.225	1

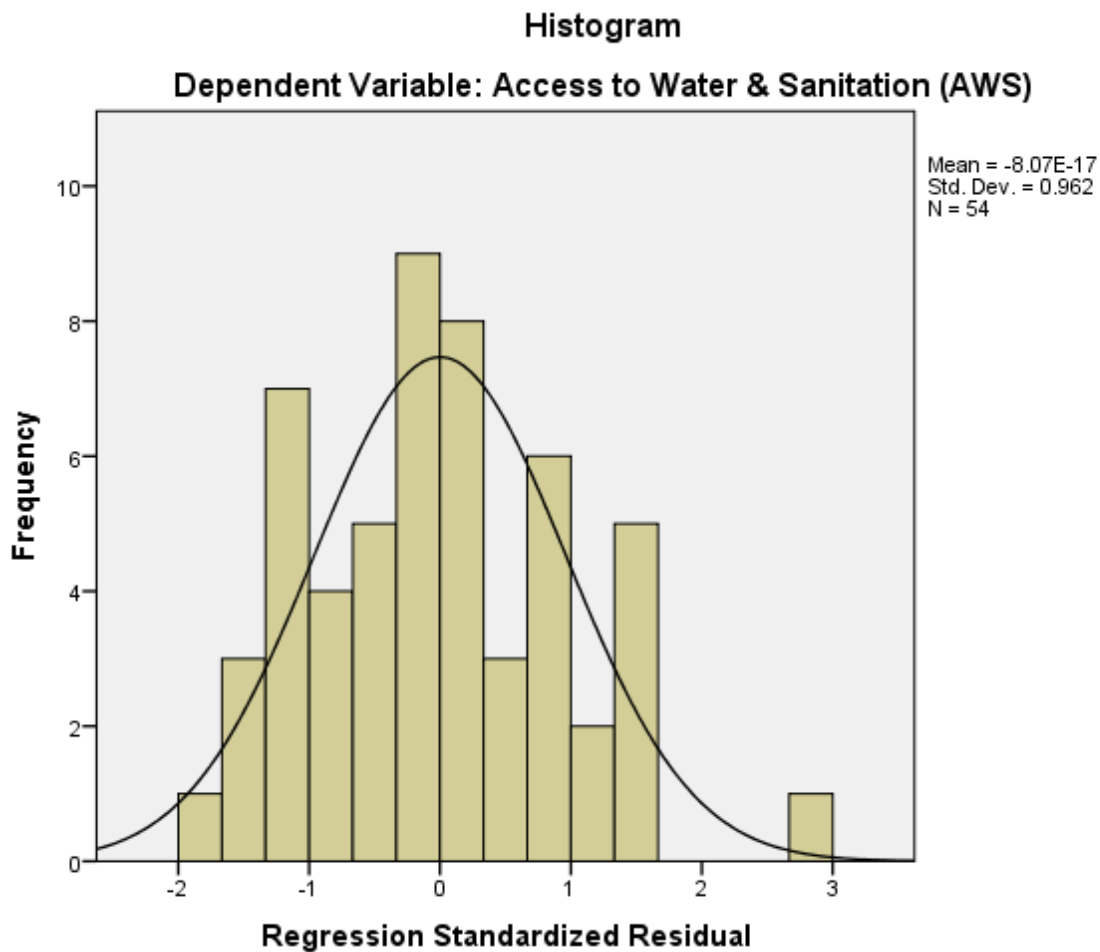
Source: Data 2017

Table 3.5 shows that when quality management system was correlated with strategy formulation it yielded 0.225. The correlations was below 0.7, the lower limit for significant multicollinearity of independent variables (Pedace, 2013); it meant that the quality management system and strategy formulation shared no significant amount of information that would make them compete

to explain a variance in the access to water and sanitation services. It was thus possible to assess the influence of each independent variable on access to water and sanitation services without the risk of factoring in shared variance between the independent variables.

### 3.8.2 Test for Normality

Test for normality was conducted to determine whether the responses on the access to water and sanitation service were normally distributed. This was fundamental in order to determine the appropriate tests to be conducted and make sure that assumptions of normal distribution were not violated (Shapiro and Wilk, 1965).



### **Figure 3.1 Histogram Showing the Distribution of Access to Water and Sanitation Services Responses**

The figure 3.1 shows that there were minimum deviations from normality in which case the overall distribution appeared normal. From the histogram it appears that the distribution is symmetrical and does not look seriously peaky or flat. This shows that the distribution was normal. A visual inspection of histograms thus showed that access to water and sanitation services responses were approximately normally distributed for all the water service providers. The distribution was, therefore, considered normal. This is also consistent with the central limit theorem that postulates that as the sample sizes get larger, the less the assumption of normality matters because the sampling distribution will be normal regardless of what the sample data look like (Elliott and Woodward, 2007; Field, 2013). According to Elliot and Woodward (2007), for large sample sizes (40 or more), central theorem can be assumed, and as such the use of parametric procedures can still be justified.

#### **3.8.3 Test for Independence for Errors**

Durbin–Watson statistic was used to detect the presence of autocorrelation in the residuals from a regression analysis (Chatterjee *et al.*, 2013). Autocorrelation makes predictors seem significant when they are not. The value of Durbin-Watson statistic lies between 0 and 4 and 1.5-2.5 for the acceptable range. According to (Verbeek, 2012) values of 2 means that there is no autocorrelation in the sample. Durbin–Watson statistic of 2.126 as shown on Table 3.5 is within the acceptable range. This shows that there was no autocorrelation in the sample, hence the residuals were found to have independent errors.

**Table 3.6 Durbin–Watson Statistic on Test of Independence of Errors**

<b>Model Summary</b>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.984 <sup>a</sup>	.969	.966	.18317852	2.126

a. Predictors: (Constant), Strategic Management (SM) , Employee Skills (ES), Infrastructure Standards (IS), Operational Efficiency (OE)

b. Dependent Variable: Access to Water & Sanitation (AWS)

Source: Data 2017

### **3.8.3 Analysis of Likert-Scale Data**

The study used a questionnaire to collect quantitative data. The questionnaire was designed in a Likert format. The Likert scale were coded in such a way that it indicated the magnitude of difference between items .Each Likert item generated a response from an ordinal 5-point Likert response categories; Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4 and Strongly Agree = 5 for level of adherence to QMS standards and application of strategy formulation. For level of access to water and sanitation services it had the following levels, Very Low = 1, Low = 2, Moderate = 3, High = 4 and Very High= 5. Consequently the averages of the summed scores also ranged from 1 to 5. In order to fulfill the equidistance assumption in the Likert scale the distance between the Likert scales was divided into 5 this resulted to equidistance of 0.8. The equidistance was distributed across the Likert resulting to the following intervals.  $1.0 < 1.8$ ,  $1.8 < 2.6$ ,  $2.6 < 3.4$ ,  $3.4 < 4.2$ ,  $4.2 < 5.00$  .The decision rule was that  $1.0 < 1.8$  considered Strongly Disagree or Very Low,  $1.8 < 2.6$  Disagree or Low,  $2.6 < 3.4$  Neutral or Moderate,  $3.4 < 4.2$  Agree or High and  $4.2 < 5.00$  as Strongly Agree or Very High.

The research went further and obtained the means of individual items and then obtained the mean of means of these items. The mean was used in the analysis and the interpretation the



results of individual items .The means of means acted as the base of the interpretation of average performance of the main variable.

### **3.9 Ethical Considerations**

This study adhered to ethical issues by undertaking the following measures. First, a research permit was sought from the Ministry of Education Science and Technology (MOEST), Department of National Commission for Science, Technology and Innovation (NACOSTI). It is only after the approval was given that data collection process commenced. Second, participation in the study by all participants was voluntary, confidential and anonymous. Third, the respondents were informed about the objectives of the study and then requested to consider participating in the research. Fourth, the principle of informed consent aimed at protecting the research participants on issues of personal disclosure and personal privacy. The identities of the participants were not disclosed in the entire study process. Fifth, participants were accorded the liberty to respond to any questions or pull out of the process at any stage. Moreover, this study did not offer inducement to participants, contact them at unreasonable time and place, subject them to any attempt to prolong the duration beyond the previously agreed duration unless the participants freely propose this as an option as shown in appendix 1.

## **CHAPTER FOUR: RESULTS AND DISCUSSION**

The chapter presents an analysis of general background information of the water service providers, level of adherence to Quality Management system standards, an analysis of influence of level of adherence to Quality Management system standards on access to water and sanitation services, analysis on influence of strategy formulation on access to water and sanitation and an analysis of moderating influence of strategy formulation on the relationship between Quality Management system standards and access to water and sanitation services in Kenya.

### **4.1 Questionnaire Return Rate**

The study investigated the influence of strategy formulation on the relationship between quality management system and access to water and sanitation services. This was necessitated by the fact that majority of Kenyans do not have access to adequate and quality water and sanitation services despite the interventions by the government and stakeholders in the water sector. Questionnaires were distributed to the general managers of 76 water service providers; the initial returned questionnaires were 49, to mitigate this low response rate a second visit was made to encourage respondents to return questionnaires in a second wave (Peress, 2010). In total 54 general managers gave complete responses. This represented a response rate of 71.05% which was good enough as indicated by Sekaran (2003) who asserted that a response rate of 70% or higher is acceptable in social science research.

### **4.2 General Background Information of the Water Service Providers**

The background information of the water service providers was studied in terms of total number of connections, employee academic qualifications, work experience of the employees, non-revenue water, labour productivity and the status of implementation of quality management system in the water service providers.

#### 4.2.1 Total Number of Connections of the water service providers

The study sought to establish the total number of connections of the water service providers. This was meant to establish the status of the infrastructure in the water service providers. The minimum number of connections of a water service provider was 7,012 connections and a maximum of 5,222,141 connections. On average there was 83, 003 connections per water service provider. This is summarized on Table4.1.

**Table 4.1 Total Number of Connections of the water service providers**

Descriptive Statistics											
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis		Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error	Statistic	Std. Error
Total number of connection	54	7012	5222141	111505.9	708787.367	7.342	.325	53.937	.639	45.949	.688

Source: Data 2017

According to WASREB (2016) there was an increase of 37,000 connections and to maintain water coverage at the current level 120,000 connections would be required annually. This implied that the water service providers should continue developing the connection infrastructure to maintain and even improve this level of water coverage.

#### 4.2.2 Employee Academic Qualifications in the Water Service Providers

The study sought to establish the academic qualifications of employees in the water service providers. This was measured in terms of employee's highest academic qualifications. This was

meant to establish the level of employees' skills in the water service providers. The study found out that majority of the employees had a diploma as their highest academic qualifications followed by first degree, then certificate holders followed by secondary education and lastly with very few having postgraduate degree .This information is summarized on Table4.2.

**Table 4.2 Employee Academic Qualifications in the Water Service Providers**

**Descriptive Statistics**

Employees Academic Qualification	N	Minimum Statistic	Maximum Statistic	Mean		Std. Deviation		Skewness		Kurtosis	
				Statistic	Std. Error	Statistic	Std. Error	Statistic	Std. Error	Statistic	Std. Error
Postgraduate	54	1	31	5.14	5.587	2.828	.361	10.505	8.897	.768	
First degree	54	1	155	20.36	27.228	2.948	.327	11.119	9.438	.695	
Diploma	54	3	200	28.36	31.924	3.441	.327	15.799	13.902	.695	
Certificate	54	1	97	19.67	25.647	1.833	.330	2.377	1.479	.702	
Secondary education	54	1	71	14.69	16.434	1.579	.354	1.990	1.231	.750	

Source: Data 2017

These findings are in agreement with the study of Nadkarni and Herrmann (2010) who observed that highly educated employee are likely to promote strategic flexibility than employees with relatively lower levels of education. The findings are also agree with the studies by King and McGrath ( 2002) which indicates that in today's constantly fluctuating environment, education was a major factor that impacts on firms' growth. This implied that the employees in the water service providers had the requisite skills for the implementation of quality management system and application of strategy formulation.

### 4.2.3 Work Experience of the Employees in the Water Service Providers

The study sought to establish the work experience of employees in the water service providers. This was measured in terms of number of years worked. This was meant to establish the level of employees' skills. The research found out that majority of the employees had a working experience of 6-10 years followed by those with 0-5 years and those with 11-15 years who were followed by 16-20 years and lastly with just a few who had worked for more than 20 years. This is summarized on Table 4.3.

**Table 4.3 Work Experience of the Employees in the Water Service Providers**

#### Descriptive Statistics

Years Worked	N	Minimum Maximum		Mean	Std. Deviation		Skewness		Kurtosis	
		Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
0-5 years	51	2	100	21.33	22.782	2.059	.333	4.314	.656	.709
6-10 years	52	1	150	37.25	34.064	1.119	.330	.858	.650	.702
11-15 years	44	1	100	20.75	24.854	1.864	.357	2.873	.702	.733
16-20 years	25	1	55	13.08	14.428	1.816	.464	3.263	.902	.902
More than 20years	9	1	16	9.11	4.859	-.255	.717	-.678	1.400	1.400

Source: Data 2017

These research findings concur with Kobia & Mohammed (2006) who studied a similar total quality management tool in the public service and observed that ninety three percent (93%) of

the employees had worked in the organizations for more than 3 years. Samuel et al, 2009 observed that labor turnover is low in public institution hence making it easy to implement the total quality management tools. A similar study by Kidombo (2007) indicated that eighty four percent (84%) of the respondents had worked for more than three years with their current employer. This implied that the employees in the water service providers have the necessary experience to implement the quality management system and supplement it with the strategy formulation.

#### **4.2.4 Labour Productivity in the Water Service Providers**

The study sought to establish the labour productivity in the water service providers. Labour Productivity refers to the number of staff in employment for every 1,000 connections. This was meant to measure the efficiency of the water service provider in utilizing their staff. Thus, a low figure is desirable. According to WASREB performance indicators, sector benchmark and scoring regime staff per 1000 connections less than 7 is considered Good that of between 7-11 % is considered Acceptable and that of greater than 11 is considered Unacceptable. Descriptive statistical analysis was used to obtain the average number of employees per 1000 connections. The study found out the numbers of staff per 1000 connections was at its minimum at 3 and maximum 45 with a mean of 11 employees. This is represented in the Table 4.4

**Table 4.4 Labour Productivity in the Water Service Providers**

	Descriptive Statistics									
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis			
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
Number of staff per 1000 connections	54	3	45	11.38	8.44	1.970	.330	4.261	.650	.70

Source: Data 2017

According to WASREB performance indicators, sector benchmark and scoring regime this level of labour productivity is considered to be almost unacceptable. A frequently used international benchmark for staff productivity is 2 employees per 1000 connections but Tynan and Kingdom (2002) proposes a benchmark of 5 employees per 1000 connections for developing countries. According to (WASREB, 2012) the average performance on labour productivity slightly improved during the period 2010/2011 from 8 to 7 staff per 1000 connections from the previous period 2009/2010. These research findings noted an opposite trend where the labour productivity in the water service providers in Kenya declined to an average of 11 employees per thousand connections. This implied that this low labour productivity was one of the causes of operational inefficiencies in the water service providers.

#### **4.2.5 None Revenue Water in the Water Service Providers**

The study sought to establish the non-revenue water in the water service providers. Non-revenue water denotes the difference between the amount of water produced for delivery and the amount of water billed to customers. This was meant to measure the efficiency of the water service provider in delivering the water to customers. It takes care of both technical losses and commercial losses. High levels of NRW indicate that water service providers are losing revenue

and will not be able to deliver proper service to its customers. According to WASREB performance indicators, sector benchmark and scoring regime non-revenue water less than 20% is considered Good that of between 40-45% is considered Acceptable and that of greater than 45% is considered Unacceptable. Descriptive statistical analysis was used to obtain percentage of non-revenue water. The study found out that non-revenue water had its minimum at 2%, maximum at 77% and a mean of 42.2%. This is represented in the Table 4.5.

**Table 4.5 Non-Revenue Water in the Water Service Provider**

**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
None revenue water %	54	2.00	77.00	42.52	15.20	.187	.639

Source: Data 2017

This level of none revenue water is well above the good practice levels for developing countries considered to be below 23 percent according to Tynan & Kingdom (2002). According to WASREB performance indicators, sector benchmark and scoring regime this level of none revenue water is considered to be unacceptable. According to the annual sector performance report by WASREB (2012), the average NRW has stagnated at 45% since 2009/2010, remaining at a level almost twice the minimum acceptable level of 25%. The research findings established a similar scenario during the 2016/2017 financial year. These findings demonstrated a similar scenario as in Arusha urban water and sanitation authority where according to Mosha (2014) none revenue water stood at 41% while the government was struggling to reach at 20% and



below. This finding confirms World Bank's (2006) findings that one of the major issues affecting water service providers in the developing world is the considerable volumes of water loss that cannot be accounted for. This high level of non-revenue water implied that there were high operational inefficiencies in the water service providers in Kenya.

#### **4.2.6 Revenue Collection Efficiency in the Water Service Providers**

The study sought to establish the revenue collection efficiency in the water service providers. Revenue collection efficiency refers to the total amount revenue collected by a water service provider expressed as a percentage of the total amount billed in a given period. It measures the effectiveness of the revenue management system of the water service provider. Revenue collected, as opposed to amounts billed, is what impacts on a water service provider ability to fund its operations. Collection efficiency is a substitute indicator on the commitment of management in optimizing the water service provider revenue inflow and is indirectly a reflection of customers' willingness to pay and by extension their satisfaction with services provided. According to WASREB performance indicators, sector benchmark and scoring regime revenue collection efficiency greater than 95% is considered Good that of between 85% -95% is considered Acceptable and that of less than 85% is considered Unacceptable. Descriptive statistical analysis was used to obtain the average revenue collection efficiency. The study found out that the revenue collection efficiency was at its minimum at 77% and maximum 92% with a mean of 86.4% revenue collection efficiency. This is represented in the Table 4.6.

**Table 4.6 Revenue Collection Efficiency in the Water Service Providers**

<b>Descriptive Statistics</b>										
	N	Minimum	Maximum	Mean		Std. Deviation	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
Revenue collection efficiency %	54	77	92	86.4	15.20	.187	.325	.187	.639	.69

Source: Data 2017

According to WASREB performance indicators, sector benchmark and scoring regime this level of revenue collection efficiency is considered to be acceptable. According to WASREB (2012) the average sector revenue collection efficiency marginally improved from 82% in 2009/2010 to 84% in 2010/11 against a sector benchmark of 85%. These research findings confirmed a further improvement of revenue collection efficiency in water service providers to 86.4% during 2016/2017 financial year. This was in agreement with Mehta, Cardone and Fugelsnes (2009) findings that the high level of revenue collection efficiency was commendable and in agreement with that the better performing water utilities in Africa which manage revenue collection rates of around 80%. This implied that the water service providers had managed to collect revenue from their customers.

#### **4.2.7 Status of Implementation of Quality Management System in the Water Service Providers**

The research sought to establish the status of the implementation of the quality management system in the water service providers. This was meant to ascertain the level of implementation of the quality management system in the water service providers. The research found out that most of the water service providers are in the process of implementing the QMS (77.8%), while

(9.3%) implemented the QMS two years ago, those that implemented QMS four years ago share the same proportion with those that haven't started the process (5.6%) and only one water service provider implemented the QMS in more than four years ago. Table 4.7 shows these findings.

**Table 4.7 Status of Implementation of Quality Management System in the Water Service Providers**

<b>Status of Implementation of QMS</b>	<b>Frequency</b>	<b>Percent</b>
Has not started the process	3	5.6
In the process of implementing the QMS	42	77.8
Implemented the QMS two years ago	5	9.3
Implemented the QMS four years ago	3	5.6
Implemented the QMS more than four years ago	1	1.9
<b>Total</b>	<b>54</b>	<b>100.0</b>

Source: Data 2017

The findings of this study were in agreement with Bayati and Taghayi (2007) who indicated that quality management system is an emerging field of study that is gradually gaining momentum due to competitive demand for quality services but not fully developed and understood. Magd (2008) also indicated that to enhance efficiency, competitiveness and customer satisfaction an increasing number of companies are developing or implementing a quality management system. This implied that in an attempt to improve the access to water and sanitation service to the members of the public the water service providers are implementing the quality management system.

### 4.3 Access to Water and Sanitation Services in the Water Services Providers.

Before embarking on the objectives of the study it was important to assess the level of access to water and sanitation services which is the independent variable of the study. Data relating to these indicators were obtained from the general managers of the selected water service providers, the general managers were requested to rate the access to water and sanitation services of the water service provider in terms of quality of drinking water, water coverage sewerage coverage and hours of supply per day. Respondents were asked to provide answers on items in the questionnaire which were measured on a five point Likert scale where 5= Very High, 4=High, 3= Moderate 2 = Low and 1= Very Low. The mean of each indicator was computed after which the mean of means was computed to assess how the managers of the water service providers rated the access to water and sanitation services. The research found out that the level of access to water and sanitation services was low. This is shown on Table 4.8.

**Table 4.8 Access to Water and Sanitation Services from the Water Service Providers**

ITEM	VL		L		M		H		VH		M	SD
	F	%	F	%	F	%	F	%	F	%		
1. Indicate the level of water coverage of your water service provider	15	27.8	16	29.6	3	5.6	7	13	13	24.1	2.3	1.6
2. Indicate the level of sewerage coverage of your water service provider	0	0	17	31.5	33	61.1	3	3.7	2	3.7	2.5	0.9
3. Indicate the quality of drinking water of your water service provider	3	5.6	16	29.6	32	59.3	2	3.7	1	1.9	2.4	0.9
4. Indicate the hours of water supply per to customers of your water service provider	13	24.1	37	70.4	1	1.9	2	3.7	0	0	2.6	0.7
<b>Mean of Means</b>											<b>2.5</b>	<b>1.0</b>

Source: Data 2017

Item one assessed the level of access to water and sanitation services in terms of level of water coverage of the water service providers. The results recorded a mean score of 2.3 and a standard deviation of 1.6. The study found out that the respondents agreed with the fact that the water coverage of water service provider was low. Item two assessed the level of sewerage coverage of your water service provider. The results recorded a mean score of 2.5 and a standard deviation of 0.9. The study found out that the respondents agreed with the fact that the sewerage coverage of the water service providers was low. Item three assessed the quality of drinking water of your water service provider. The results recorded a mean score of 2.4 and a standard deviation of 0.9. The study found out that the respondents agreed with the fact that the quality of drinking water of the water service providers was low. Item four assessed the hours of water supply per day of the water service provider. The results recorded a mean score of 2.6 and a standard deviation of 0.7. The study found out that the respondents agreed with the fact that the hours of water supply per day of the water service providers were moderate. The study computed the mean of means of the four items that extricated the access to water and sanitation services. The mean of means was 2.5 and a standard deviation of 1.0. The results indicated that the level of access to water and sanitation services was low.

This is in agreement with Asingo, 2005 findings who indicated that many African countries have been unable to fully meet the demand for water and sanitation services. It also confirmed the UNDP 2012 findings which indicated that more than 50% Kenyan households do not have access to safe drinking water.

#### **4.4 Level of Adherence to Quality Management System Standards and access to water and sanitation services in Kenya**

The first objective of this study was to determine the influence of quality management system on access to water and sanitation services. To achieve this Resource Based Theory postulates that competitive advantage can be derived from resources and capabilities from within the organization (Barney, 2001). Studies conducted using the Resource Based Theory have identified skills, processes and assets (operationalized as infrastructure, employees skills and operational efficiency in this study) as possible leverages for converting resources into a competitive advantage (Miller, 2003).

##### **4.4.1 Level of Adherence to Infrastructure Standards in the Water Service Providers in Kenya**

The research sought to establish the level of adherence to infrastructure standards in terms of production capacity, connections, storage capacity and sewerage infrastructure. In this study the strength of adherence to infrastructure standards was measured in terms of adherence to QMS standards on production capacity, connections, storage capacity and sewerage infrastructure. The variable had twelve items assessing the level of adherence to infrastructure standards. Respondents were asked to provide answers on the twelve items in the questionnaire that were measured by a five point Likert scale where 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree and 1 = Strongly Disagree. The mean of each item was computed to assess the extent to which the water service provider adhered to the specific standards after which the mean of means was computed to get the level of adherence to infrastructure standards of the water service providers.

It specifically evaluated the mean of individual indicators and their mean of means. The mean measured the extent to which the water service provider adheres to the specific standard. The

research found out that that the level of adherence infrastructure standards was high. These findings are presented on Table 4.9.

**Table 4.9 Level of Adherence to Infrastructure Standards in the Water Service Provider in Kenya**

ITEM	S D		D		N		A		SA		M	SD
	n	%	N	%	N	%	N	%	N	%		
1.The production capacity of the water service provider is in line with the quality management system Standards	1	1.9	3	5.6	13	24.1	11	20.4	26	48.1	4.1	1.0
2.The QMS audit did not detect any none conformity on adherence to production capacity Standards	0	0	3	5.6	18	33.3	23	42.6	10	18.5	3.7	0.8
3.The water service provider has adequately implemented the QMS requirements on production capacity Standards	2	3.7	7	13	10	18.5	21	38.9	14	25.9	3.7	1.1
4.The connections of the water service provider are in line with the quality management system Standards	2	3.7	4	7.4	17	31.5	23	42.6	8	14.8	3.6	1.0
5.The QMS audit did not detect any none conformity on adherence to connections Standards	4	7.4	5	9.3	17	31.5	22	40.7	6	11.1	3.4	1.1
6.The water service provider has adequately implemented the QMS requirements on connections Standards	3	5.6	11	20.4	3	5.6	10	18.5	27	50	4.2	1.4
7.The storage capacity of the water service provider is in line with the quality management system Standards	4	7.4	8	14.8	5	9.3	25	46.3	12	22.2	3.6	1.2
8.The QMS audit did not detect any none conformity on adherence to storage capacity Standards	12	22.2	11	20.4	8	14.8	7	13	16	29.6	3.1	1.6
9.The water service provider has adequately implemented the QMS requirements on storage capacity	3	5.6	7	13	9	16.7	11	20.4	24	44.4	4.2	1.6

Standards

<b>10.</b> The water service provider has adequately implemented the QMS requirements on sewerage infrastructure Standards	1	1.9	2	3.7	6	11.1	20	37	25	46.3	4.2	0.9
<b>11.</b> The QMS audit did not detect any none conformity on adherence to sewerage infrastructure Standards	2	3.7	3	5.6	10	18.5	17	31.5	22	40.7	4.0	1.1
<b>12.</b> The water service provider has adequately implemented the QMS requirements on sewerage infrastructure Standards	1	1.9	6	11.1	10	18.5	13	24.1	24	44.4	4.0	1.1
<b>Mean of Means</b>											<b>3.8</b>	<b>1.1</b>

Source: Data 2017

Item one assessed the extent to which the production capacity of the water service provider is in line with the quality management system Standards. The results recorded a mean score of 4.1 and a standard deviation of 1.00. The study found out that the respondents agreed with the fact that the water service provider production capacity was in line with the quality management system Standards. Item two assessed whether the QMS audit detected any none conformity on adherence to production capacity standards. The results recorded a mean score of 3.7 and a standard deviation of 0.8. The study found out that the respondents agreed with the fact that the QMS audit did not detect any none conformity on adherence to production capacity Standards. Item three assessed the extent to which the water service provider had implemented the QMS requirements on production capacity Standards. The results recorded a mean score of 3.7 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the



water service providers had implemented the QMS requirements on production capacity Standards.

Item four assessed the extent to which the connections of the water service provider are in line with the quality management system Standards. The results recorded a mean score of 3.6 and a standard deviation of 1.00. The study found out that the respondents agreed with the fact that the connections of the water service provider are in line with the quality management system Standards. Item five assessed whether the QMS audit detected any non-conformity on adherence to connections Standards. The results recorded a mean score of 3.4 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the QMS audit did not detect any non-conformity on adherence to connections Standards. Item six assessed whether the water service provider had adequately implemented the QMS requirements on connections Standards. The results recorded a mean score of 4.2 and a standard deviation of 1.4. The study found out that the respondents strongly agreed with the fact that the water service provider had adequately implemented the QMS requirements on connections Standards.

Item seven assessed the extent to which the storage capacity of the water service provider was in line with the quality management system standards. The results recorded a mean score of 3.6 and a standard deviation of 1.2. The study found out that the respondents agreed with the fact that the storage capacities of the water service providers are in line with the quality management system standards. Item eight assessed whether the QMS audit detected any non-conformity on adherence to storage capacity standards. The results recorded a mean score of 3.1 and a standard deviation of 1.6. The study found out that the respondents were neutral on whether the QMS audit did not detect any non-conformity on adherence to storage capacity standards. Item nine assessed whether the water service provider had adequately implemented the QMS

requirements on storage capacity standards. The results recorded a mean score of 4.2 and a standard deviation of 1.6. The study found out that the respondents strongly agreed with the fact that the water service provider had adequately implemented the QMS requirements on storage capacity standards.

Item ten assessed the extent to which the sewerage infrastructure of the water service provider was in line with the quality management system standards. The results recorded a mean score of 4.2 and a standard deviation of 1.6. The study found out that the respondents strongly agreed with the fact that the sewerage infrastructure of the water service providers is in line with the quality management system standards. Item eleven assessed whether the QMS audit detected any non-conformity on adherence to sewerage infrastructure standards. The results recorded a mean score of 4.2 and a standard deviation of 0.9. The study found out the respondents strongly agreed with the fact that the QMS audit did not detect any non-conformity on adherence to sewerage infrastructure standards. Item twelve assessed whether the water service provider had adequately implemented the QMS requirements on sewerage infrastructure standards. The results recorded a mean score of 4.0 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the water service provider had adequately implemented the QMS requirements on sewerage infrastructure standards.

The study computed the mean of means of the twelve items that extricated the level of adherence to infrastructure standards. The mean of means was 3.8 and a standard deviation of 1.1. The results indicated that the level of adherence infrastructure standards was high. This implied that the water service providers have been making enough efforts to adhere to quality management system standards on infrastructure development.

#### **4.4.2 Level of Adherence to Employee Skills Standards in the Water Service**

##### **Providers in Kenya**

The study sought to establish the influence of the level of adherence to employee skills standards on access to water and sanitation services. In this study the strength of adherence to employee skills standards was measured in terms of the academic qualification of the employees, work experience of the employees and training and development programs in the water service providers. The variable had nine items assessing the level of adherence to employee's skills standards. Respondents were asked to provide answers to the nine items in the questionnaire that were measured by a five point Likert scale where 5 = Strongly Agree, 4 = Agree 3 = Neutral 2 = Disagree and 1 = Strongly Disagree. The mean of each item was computed to assess the extent to which the water service provider adhered to the specific standards after which the mean of means was computed to get the level of adherence to employees skills standards of the water service providers. The research found out that the level of adherence employees' skills standards was high. This is shown on Table 4.10

**Table 4.10 Adherence to Employee’s Skills Standards in the Water Service Providers in Kenya**

ITEM	SD		D		N		A		SA		M	SD
	N	%	N	%	N	%	N	%	N	%		
1.The employees qualifications of the water service provider are in line with the quality management system Standards	2	3.7	6	11.1	7	13	20	37	19	35.2	3.9	1.1
2.The QMS audit did not detect any none conformity on adherence to employees qualifications Standards	1	1.9	3	5.6	7	13	19	35.2	24	44.4	4.2	1.0
3.The water service provider has adequately implemented the QMS requirements on employees qualifications Standards	2	3.7	1	1.9	5	9.3	24	44.4	22	40.7	4.2	0.9
4.The employees experience of the water service provider are in line with the quality management system Standards	1	1.9	6	11.1	7	13	20	37.7	20	37.7	4.0	1.1
5.The QMS audit did not detect any none conformity on adherence to employees experience Standards	2	3.7	7	13	5	9.3	21	38.9	19	35.2	3.9	1.1
6.The water service provider has adequately implemented the QMS requirements on employees experience	3	5.6	4	7.4	9	16.7	16	29.6	22	40.7	3.9	1.2
7.The training and development programs of the water service provider are in line with the quality management system Standards	2	3.7	9	16.7	12	22.2	21	38.9	10	18.5	3.5	1.1
8.The QMS audit did not detect any none conformity on adherence to training and development programs Standards	5	9.3	5	9.3	14	25.9	20	37	10	18.5	3.5	1.2
9.The water service provider has adequately implemented the QMS requirements on training and development programs	6	11.1	3	5.6	6	11.1	18	33.3	21	38.9	3.8	1.3
<b>Mean Of Means</b>											<b>3.9</b>	<b>1.1</b>

Source: Data 2017

Item one assessed the extent to which the employees' qualifications of the water service provider are in line with the quality management system standards. The results recorded a mean score of 3.9 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the employees' qualifications of the water service provider are in line with the quality management system Standards. Item two assessed whether the QMS audit detected any none conformity on adherence to employees qualifications standards. The results recorded a mean score of 4.2 and a standard deviation of 1.0. The study found out that the respondents strongly agreed with the fact that the QMS audit did not detect any none conformity on adherence to employees qualifications Standards. Item three assessed the extent to which the water service provider has adequately implemented the QMS requirements on employees' qualifications Standards. The results recorded a mean score of 4.2 and a standard deviation of 0.9. The study found out that the respondents strongly agreed with the fact that the water service providers had implemented the QMS requirements on employees' qualifications standards.

Item four assessed the extent to which the employees experience of the water service provider are in line with the quality management system standards. The results recorded a mean score of 4.0 and a standard deviation of 1.0. The study found out that the respondents agreed with the fact that the employees' experience of the water service provider is in line with the quality management system standards. Item five assessed whether the QMS audit detected any none conformity on adherence to employees experience standards. The results recorded a mean score of 3.9 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the QMS audit did not detect any none conformity on adherence to employees experience standards. Item six assessed the extent to which the water service providers

have adequately implemented the QMS requirements on employees' experience. The results recorded a mean score of 3.9 and a standard deviation of 1.2. The study found out that the respondents agreed with the fact that the water service providers had implemented the QMS requirements on employees' experience Standards.

Item seven assessed the extent to which the training and development programs of the water service providers are in line with the quality management system standards. The results recorded a mean score of 3.5 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the training and development programs of the water service provider are in line with the quality management system standards. Item eight assessed whether the QMS audit detected any non-conformity on adherence to training and development programs standards. The results recorded a mean score of 3.5 and a standard deviation of 1.2. The study found out that the respondents agreed with the fact that the QMS audit did not detect any non-conformity on adherence to training and development programs standards. Item nine assessed the extent to which the water service providers have adequately implemented the QMS requirements on training and development programs. The results recorded a mean score of 3.8 and a standard deviation of 1.3. The study found out that the respondents agreed with the fact that the water service providers had implemented the QMS requirements on training and development programs standards.

The study computed the mean of means of the nine items that extricated the level of adherence to employees' skills standards. The mean of means was 3.9 and a standard deviation of 1.1. The results indicated that the level of adherence employees' skills standards was high. This implied that the employees had the requisite qualification and experience to ensure all the operations in the water service providers are carried out effectively and efficiently.

### **4.4.3 Level of Adherence to Operational Efficiency Standards in the Water Service**

#### **Providers in Kenya**

The study sought to establish the influence of the level of adherence to operational efficiency standards on access to water and sanitation services. Adherence to operational efficiency standards is identified as the independent variable that predicts the dependent variable which is the access to water and sanitation services. Philippe Marin (2009) indicated that although water service providers operations have multiple aspects, in practice, the overall efficiency of an operator can be broadly captured by three main indicators: water losses, revenue collection, and labor productivity. In this study the strength of adherence to adherence to operational efficiency standards was measured in terms of level of adherence to QMS standards on labour productivity ,none revenue water and revenue collection efficiency.

The variable had nine items assessing the level of adherence to operational efficiency standards. Respondents were asked to provide answers on the nine items in the questionnaire that were measured by a five point Likert scale where 5= Strongly Agree ,4 = Agree 3 = Neutral 2 = Disagree and 1= Strongly Disagree . The mean of each item was computed to assess the extent to which the water service provider adhered to the specific standards after which the mean of means was compute to get the level of adherence to operational efficiency standards of the water service providers. The results indicated that the level of adherence to revenue collection efficiency standards were high. This is shown on Table 4.11

**Table 4.11 Adherence to Operational Efficiency Standards**

ITEM	SD		D		N		A		SA		M	SD
	N	%	N	%	N	%	N	%	N	%		
1.The water service provider efforts to reduce none revenue water are in line with the quality management system Standards	5	9.3	7	13	10	18.5	22	40.7	10	18.5	3.5	1.2
2.The QMS audit did not detect any none conformity on adherence to none revenue water Standards	3	5.6	4	7.4	14	25.9	19	35.2	14	25.9	3.7	1.1
3.The water service provider has adequately implemented the QMS requirements on none revenue water	1	1.9	7	13	10	18.5	22	40.7	14	25.9	3.8	1.0
4.The water service provider ratio of employees to connections are in line with the quality management system Standards (labour productivity)	7	13	6	11.1	19	35.2	16	29.6	6	11.1	3.2	1.2
5.The QMS audit did not detect any none conformity on adherence to ratio of employees to connections Standards	9	16.7	11	20.4	14	25.9	15	27.8	5	9.3	2.9	1.2
6.The water service provider has adequately implemented the QMS requirements on labour productivity Standards	11	20.4	13	24.1	9	16.7	15	27.8	6	11.1	2.9	1.3
7.The water service provider revenue collection efficiency is in line with the quality management system Standards	8	14.8	11	20.4	8	14.8	16	29.6	11	20.4	3.2	1.4
8.The QMS audit did not detect any none conformity on revenue collection efficiency Standards	3	5.6	3	5.6	8	14.8	16	29.6	24	44.4	4.0	1.2
9.The water service provider has adequately implemented the QMS requirements on revenue collection efficiency Standards	2	3.7	3	5.6	8	14.8	13	24.1	28	51.9	4.2	1.1
<b>Mean of Means</b>											<b>3.5</b>	<b>1.2</b>

Source: Data 2017



Item one assessed the extent to which the water service providers' efforts to reduce none revenue water were in line with the quality management system Standards. The results recorded a mean score of 3.5 and a standard deviation of 1.2. The study found out that the respondents agreed with the fact that the water service providers' efforts to reduce non-revenue waters are in line with the quality management system Standards. Item two assessed whether the QMS audits detected any none conformity on adherence to none revenue water standards. The results recorded a mean score of 3.7 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the QMS audit did not detect any none conformity on adherence to none revenue water standards. Item three assessed the extent to which the water service providers have adequately implemented the QMS requirements on non- revenue water. The results recorded a mean score of 3.8 and a standard deviation of 1.0. The study found out that the respondents agreed with the fact that the water service providers had implemented the QMS requirements on none revenue water standards.

Item four assessed the extent to which the water service provider ratio of employees to 1000 connections (labour productivity) are in line with the quality management system standards .The results recorded a mean score of 3.2 and a standard deviation of 1.2. The study found out that the respondents were neutral with the fact that the ratios of employees to connections of the water service provider are in line with the quality management system standards. Item five assessed whether the QMS audit detected any none conformity on adherence to ratio of employees to connections standards. The results recorded a mean score of 2.9 and a standard deviation of 1.2. The study found out that the respondents were neutral with the fact that the QMS audit did not detect any none conformity on adherence to ratio of employees to connections standards. Item six assessed the extent to which the water service providers have adequately implemented the

QMS requirements on labour productivity standards. The results recorded a mean score of 2.9 and a standard deviation of 1.3. The study found out that the respondents were neutral with the fact that the water service providers had implemented the QMS requirements on labour productivity standards.

Item seven assessed the extent to which the water service provider revenue collection efficiency is in line with the quality management system standards. The results recorded a mean score of 3.2 and a standard deviation of 1.4. The study found out that the respondents were neutral with the fact that the revenue collection efficiency of the water service providers is in line with the quality management system standards. Item eight assessed whether the QMS audit detected any non-conformity on revenue collection efficiency standards. The results recorded a mean score of 4.0 and a standard deviation of 1.2. The study found out that the respondents agreed with the fact that the QMS audit did not detect any non-conformity on adherence revenue collection efficiency standards. Item nine assessed the extent to which the water service provider has adequately implemented the QMS requirements on revenue collection efficiency standards. The results recorded a mean score of 4.2 and a standard deviation of 1.1. The study found out that the respondents strongly agreed with the fact that the water service providers had implemented the QMS requirements on revenue collection efficiency standards.

The study computed the mean of means of the nine items that extricated the level of adherence to employees' skills standards. The mean of means was 3.5 and a standard deviation of 1.2. The results indicated that the level of adherence to revenue collection efficiency standards was high. This implies that the water service providers are aligning the level of operational efficiency with the quality management system standards.

#### 4.4.4 Summary of Level of Adherence to Quality Management System Standards in the Water Service Providers in Kenya

The study found it necessary to summarize the findings on the level of adherence to quality management standards in the water service providers. Means and standard deviation were used to present the results on the three dimensions of quality management system standards. The study found that the level of adherence to quality management system was high. The results for the three dimensions of the quality management system standards are presents in Table 4.12.

**Table 4.12 Summary of Level of Adherence to Quality Management System Standards in the Water Service Providers in Kenya**

Quality Management System Dimensions	Mean	Standards Deviation
1.Infrastructure Standards	3.8	1.1
2.Employees Skills Standards	3.9	1.1
3.Operational Efficiency Standards	3.5	1.2
Mean Of Means	3.7	1.1

Source: Data 2017

The results in Table 4.13 show that the highest level of adherence to quality management system standards was on employees' skills which recorded a mean of 3.9 this contradicted with Siquilaba, Mckenzie and Wegelin (2012) who carried out a study on the role of training and capacity building in the implementation of water demand management in South Africa. The study found out that the key challenge in the water service providers was the skills development. The lowest level of adherence to quality management system standards was on operational efficiency which recorded a mean of 3.5. This was in agreement with Bichanga (2013) who found out that operational inefficiency in the water service providers contributed to limited

access to water and sanitation services. The overall rating indicated that the level of adherence to quality management system standards in the water service providers in Kenya was high. This was in agreement with Magd (2008) who indicated that to enhance efficiency, competitiveness and customer satisfaction an increasing number of companies are developing or implementing a quality management system.

#### **4.4.5 Relationship between the Level of Adherence to Quality Management System Standards and Access to Water and Sanitation Services in Kenya**

Pearson product moment correlation coefficients were used to establish whether a relationship existed between the level of adherence to quality management system standards and access to water and sanitation services. To start with the three dimensions of quality management system were correlated with access to water and sanitation services. All the correlations were deemed significant at a set value of 0.05 the results are presented in Table 4.13

**Table 4.13 Correlation Analysis of Level of Adherence Quality Management System Standards and Access to Water and Sanitation Services**

	Access to Water & Sanitation (AWS)	Infrastructure Standards (IS)	Employee Skills (ES)	Operational Efficiency (OE)
Access to Water & Sanitation (AWS)	1			
Infrastructure Standards (IS)	.729**	1		
	0.00			
Employee Skills (ES)	.609**	0.225	1	
	0.00	0.102		
Operational Efficiency (OE)	.744**	.332*	.453**	1
	0.00	0.014	0.001	

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Source: Data 2017

Adherence to operational efficiency standards had the highest positive relationship with access to water and sanitation services ( $r=0.744, p=0.00$ ) followed by level of adherence to infrastructure standards ( $r=0.729, p=0.00$ ) and adherence to employees skills had the lowest positive relationship with the access to water and sanitation services ( $r=0.609, p=0.00$ ). This implied that an increase in the level of adherence in all the three dimensions of the quality management system standards leads to an increase in access to water and sanitation services. This was in agreement with studies done by Magd et al. (2012) who carried out a study on factors motivating the implementation of quality management systems in UAE organizations. The study found a

positive relationship between QM Practices and innovation. Kaynak et al. (2005) also found out that high performing firms had implemented QM practices to a greater extent than low performing firms, which shows that QM practices can definitely add advantage. Lo et al. (2009) revealed that ISO 9000 standards implementation in US manufacturing firms led to decrease in number of inventory days and significant improvement in overall operating cycle time. It was also in agreement with Martinez - Costa et al. (2008) who studied implementation of TQM Practices and ISO 9000 Standards together. It was found that internal motivation to implement ISO 9000 standards resulted in high performance, whereas external motivation did not. The hypothesis was further tested over the three dimensions of the quality management system.

#### **4.4.5.1 Level of Adherence to Infrastructure Standards and Access to Water and Sanitation Service**

The study tested the **Hypothesis one (a)** that there is no significant influence of the level of adherence to infrastructure standards on the access to water and sanitation services in Kenya. This was tested using a simple regression model i.e. Equation 3.1.

The model represented a value of  $R^2$  which show the proportion of variation in dependent variable explained by the regression model. Table 4.14 show that the level of adherence to infrastructure standards had a coefficient adjusted  $R^2=0.52$  this indicates that 52% of the variation in access to water and sanitation service can be accounted for by the level of adherence to infrastructure standards.

**Table 4.14 Level of Adherence to Infrastructure Standards and Access to Water and Sanitation Service**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.73	0.53	0.52	0.69

a Predictors: (Constant), Infrastructure Standards (IS)

c Dependent Variable: Access to Water & Sanitation (AWS)

Source: Data 2017

**Table 4.15 Coefficients of Level of Adherence to Infrastructure Standards**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.88E-17	0.09		0.00	1
	Infrastructure Standards (IS)	0.73	0.10	0.73	7.30	0.00

a Dependent Variable: Access to Water & Sanitation (AWS)

Source: Data 2017

Data from Table 4.15,  $X_1$  the independent variable which is adherence to infrastructure standards contributed to  $R^2 = 0.53$  adjusted  $R^2 = 0.52$ . The final model is  $Y = 1.88E-17 + 0.73 X_1$  where  $Y =$  Access to water and sanitation services and  $X_1 =$  Infrastructure standards (IS). For the hypothesis that there is no significant influence of the level of adherence to Infrastructure Standards on the access to water and sanitation services in Kenya, the study found the relationship to be

statistically significant. Therefore rejecting the null hypothesis and accepting the alternative hypothesis that the level of adherence to infrastructure standards significantly influences the access to water and sanitation services. This means that an increase in level of adherence to infrastructure standards of one unit influenced the level of access of water and sanitation services by 73%. This indicated that there is positive linear relationship between level of adherence to infrastructure standards and access to water and sanitation services. This was in agreement with Asante (2010) who found a significant relationship of infrastructure and sustainable water service delivery in the rural sector of Ghana. VonDach (2007) also established a positive relationship between infrastructure development and access to water and sanitation services in Kenya.

#### **4.4.5.2 Level of Adherence to Employee's Skills Standards and access to water and sanitation services**

The study tested the **Hypothesis one (b)** that there is no significant influence of level of adherence to employees' skills standards on access to water and sanitation services. To test this, the following a simple regression model was used i.e. Equation 3.2.

The model represented the value of  $R^2$  which show the proportion of variation in dependent variable explained by the regression model. Table 4.13 show that level of adherence to employees skills standards had a coefficient of adjusted  $R^2 = 0.36$  this indicates that 36% of the variation in access to water and sanitation service can be accounted for by the level of adherence to employees skills standards.



**Table 4.16 Level of Adherence to Employee's Skills Standards**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.61a	0.37	0.36	0.80

a Predictors: (Constant), Employee Skills (ES)

c Dependent Variable: Access to Water & Sanitation (AWS)

Source: Data 2017

**Table 4.17 Coefficients of Level of Adherence to Employees Skills Standards.**

Mode		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
1		B	Std. Error	Beta		
	1 (Constant)	2.94E-17	0.109		0.00	1
	Employee Skills (ES)	0.61	0.11	0.61	5.54	0.00

a Dependent Variable: Access to Water & Sanitation (AWS)

Y = Access to water and sanitation services and X<sub>2</sub> = Employee Skills (ES)

Source: Data 2017

Data from Table 4.15, X<sub>1</sub> the independent variable which is adherence to employees skills standards contributed to R<sup>2</sup>=0.37 and adjusted R<sup>2</sup>=0.36. The final model is Y= 2.94E-17+ 0.61X<sub>2</sub> where Y = Access to water and sanitation services and X<sub>1</sub> = employees skills Standards (ES). For the hypothesis that there is no significant influence of the level of adherence to employees' skills Standards on the access to water and sanitation services in Kenya. The study found that the relationship to be statistically significant, therefore rejecting the null hypothesis

and accept the alternative hypothesis that the level of adherence to employee skills standards significantly influence the access to water and sanitation services. This means that an increase in level of adherence to employees' skills standards of one unit influenced the level of access of water and sanitation services by 61%. The findings differed with Salleh, Yakuub and Dzulkifi (2011) who found out that job performance of public service employees in Malaysia had no relationship with the skills level. The findings were in agreement with Red and Reenen (2005) who found out that training is significantly associated with high productivity. Survery and luks (2004) also found out that firms regarded skills as an important precursor for improved productivity. Matata (2015) found out that there is a significant positive impact of employee's skills on organization through improved service delivery, quality production and hence giving an organization competitive edge in the market.

#### **4.4.5.3 Relationship between the Level of Adherence to Operation Efficiency Standards and Access to Water and Sanitation Services in Kenya**

The study tested the **Hypothesis one (c)** that there is no significant influence of level of adherence to operational efficiency standards and access to water and sanitation services. To test this, a simple regression model was used i.e. Equation 3.3.

The model represented the value of  $R^2$  which show the proportion of variation in dependent variable explained by the regression model. Table 4.16 show that level of adherence to operational efficiency standards had a coefficient of adjusted  $R^2 = 0.55$  this indicates that 55 % of the variation in access to water and sanitation service can be accounted for by the level of adherence to operational efficiency Standards.

**Table 4.18 level of adherence to operation efficiency standards**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.74a	0.56	0.55	0.67

a Predictors: (Constant), Operational Efficiency (OE)

c Dependent Variable: Access to Water & Sanitation (AWS)

Source: Data 2017

**Table 4.19 Coefficient of level of adherence to operation efficiency standards on access to water**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.81E-16	0.09		0.00	1
	Operational Efficiency (OE)	0.74	0.09	0.74	8.03	0.00

a Dependent Variable: Access to Water & Sanitation (AWS)

Y= Access to water and sanitation services and X<sub>3</sub>= Operational Efficiency (OE)

Source:

Data 2017

Data from Table 4.16, X<sub>3</sub> the independent variable which is adherence to operational efficiency standards contributed to R<sup>2</sup>=0.56 and adjusted R<sup>2</sup> = 0.55. The final model is Y= -1.81E-16+ 0.74X<sub>3</sub> where Y= Access to water and sanitation services and X<sub>3</sub> = operational efficiency Standards (ES). For the hypothesis that there is no significant influence of the level of adherence

to operational efficiency standards on the access to water and sanitation services in Kenya, the study found the relationship to be statistically significant. Therefore rejecting the null hypothesis and accept the alternative hypothesis that is, the level of adherence to operational efficiency standards significantly influence the access to water and sanitation services. This means that an increase in level of adherence to operational efficiency standards of one unit influenced the level of access of water and sanitation services by 74%.

This was in agreement with Bichaga (2013) who found out that operational efficiency contributed to access to water and sanitation services. These findings also concurred with Kayunga and Njiru (2007) who found out that bloated staff was a major cause of operational inefficiency and impacted negatively on the performance of water and sanitation sector.

The study tested the overall **Hypothesis one** that there is no significant influence of level of adherence to quality management system standards and access to water and sanitation services.

To test this, a simple regression model was used i.e Equation 3.4.

**Table 4.20 Model Summary of Influence of Adherences to Quality Management System Standards and Access to Water and Sanitation Services**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. Change	F
1	.91a	0.83	0.82	0.42	0.83	247.98	1	52	0.00	

1. Predictors: (Constant), QMS

Source: Data 2017

**Table 4.21 Coefficients of Influence strategy formulation on the Relationship between Adherences to Quality Management System Standards**

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	4.11E-17	0.06		0.00	1.00
QMS	0.91	0.06	0.91	15.17	0.00

QMS (Quality Management System)

Source: Data 2017

The results in Table 4.19 show that quality management system accounts for 82% of the variation of access to water and sanitation services (Adjusted  $R^2=0.82$ ). The results show a statistical significance for the effect of quality management system on access to water and sanitation services ( $t= 15.75$ ,  $p<0.05$ ). The study there for rejected the hypothesis that there is no significant influence of quality management system standards on access to water and sanitation services in Kenya. Therefore the hypothesis was rejected. These research findings were in agreement with White et al. (2009) who examined the rationale for establishing a quality management system in non-profit small to medium enterprises in the United Kingdom. The study found out that through correct development of quality management systems, organizations were able to generate bottom-line savings and business performance enhancement. It was also in agreement with Mungula (2013) who undertook a study on effect of quality management system on the organization performance in Tanzania. The study found out that the quality and quantity of the organizations that had implemented quality management system had significantly improved. Matata (2015) undertook a study on the effect of quality management system on the performance of Kenya Ports Authority. The study found out that there is a significant positive impact on the performance of the organization through improved service delivery, quality

production; hence, giving the organization a competitive edge in the market. These research findings contradicted (Mead, 2011) who indicated that quality management system is a mere waste of time and does not encourage business improvement.

#### 4.5 Influence of Application of Strategy formulation on Access to Water and Sanitation Services.

The second objective of the study was to determine the effect of strategy formulation on access to water and sanitation services. In order to achieve this objective the measurement of the application of strategy formulation was first determined.

##### 4.6.1 Application of Strategy formulation

The study conducted a survey on how the water service providers apply the strategy formulation. Strategy formulation were measured in terms of the use of well-structured planning mechanism, communicating the mission and vision to all stakeholders, basing decisions and actions on formulated organization policies and use of resource control teams. The study examined how strategy formulation were implemented. The respondents were asked to provide answers on each item that was measured by a five point Likert scale. Where 5=strongly agree, 4= agree, 3= agree, 2=disagree and 1strongly disagree .The results are presented in Table 4.21.

**Table 4.22 Application of Strategy formulation**

ITEM	SA		D		N		A		SA		M	SD
	N	%	N	%	N	%	N	%	N	%		
1.The water service provider has a well written mission and vision	4	7.4	6	11.1	13	24.1	26	48.1	5	9.3	3.4	1.1
2.All the stakeholders of the organization understands the organizations mission and vision	6	11.1	5	9.3	17	31.5	23	42.6	3	5.6	3.2	1.1
3.The water service provider mission and vision are well displayed in	5	9.3	7	13	20	37	19	35.2	3	5.6	3.2	1.0

strategic places in the organization

4.The organization has well developed plans of activities	7	13	7	13	12	22.2	21	38.9	7	13	3.3	1.2
5.The organization uses well-structured planning mechanism	9	16.7	13	24.1	16	29.6	13	24.1	3	5.6	2.8	1.2
6.The water service provider adheres to its plan of activities	3	5.6	5	9.3	13	24.1	26	48.1	7	13	3.5	1.0
7.The water service provider have well formulated organization policies	3	5.6	5	9.3	13	24.1	26	48.1	7	13	3.5	1.0
8.The water service provider base its decisions and actions on formulated organization policies	3	5.6	5	9.3	23	42.6	19	35.2	4	7.4	3.3	0.9
9.The water service provider adheres to its formulated organization policies	3	5.6	9	16.7	24	44.4	13	24.1	5	9.3	3.2	1.0
10.The organization has constituted resource control teams	2	3.7	6	11.1	5	9.3	19	35.2	22	40.7	4.0	1.1
11.The resource control teams has representation from all the departments	2	3.7	5	9.3	13	24.1	17	31.5	17	31.5	3.8	1.1
12.All the members of the resource control teams give suggestions on resource allocation	0	0	3	5.6	0	0	21	38.9	30	55.6	4.4	0.8
<b>Mean of Means</b>											<b>3.5</b>	<b>1.0</b>

Source: Data 2017

Item one assessed the extent to which the water service providers have a well written mission and vision. The results recorded a mean score of 3.4 and a standard deviation of 1.1. The study found out that the respondents were neutral with the fact that the water service providers have a well written mission and vision. Item two assessed whether the all the stakeholders of the water service provider understood the organizations mission and vision. The results recorded a mean score of 3.2 and a standard deviation of 1.1. The study found out that the respondents were neutral with the fact that all the stakeholders of the water service provider understand the organizations mission and vision. Item three assessed the extent to which the water service

provider mission and vision were well displayed in strategic places in the organization .The results recorded a mean score of 3.2and a standard deviation of 1.0. The study found out that the respondents were neutral with the fact that the water service provider mission and vision are well displayed in strategic places in the organization.

Item four assessed the extent to which the organization has well developed plans of activities. The results recorded a mean score of 3.2 and a standard deviation of 1.1. The study found out that the respondents were neutralwith the fact that the organizations have well developed plans of activities. Item five assessed whether the organization uses well-structured planning mechanism .The results recorded a mean score of 2.8and a standard deviation of 1.2. The study found out that the respondents were neutral with the fact the organization uses well-structured planning mechanism. Item six assessed the extent to which the water service providers adhere to its plan of activities. The results recorded a mean score of 3.5and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the water service providers adhere to their plans of activities.

Item seven assessed the extent to which the water service providers have well formulated organization policies. The results recorded a mean score of 3.5and a standard deviation of 1.0. The study found out that the respondents agreed with the fact that the water service providers have well formulated organization policies. Item eight assessed whether the water service providers base their decisions andactions on formulated organization policies. The results recorded a mean score of 3.3 and a standard deviation of 0.9. The study found out that the respondents were neutral with the fact that the water service providers base their decisions on well formulated organization policies Item nine assessed whether the water service providers adhere to formulated organization policies. The results recorded a mean score of 3.2and a



standard deviation of 1.0. The study found out that the respondents were neutral with the fact that the water service providers base their decisions and actions on formulated organization policies.

Item ten assessed whether the water service providers have constituted resource control teams. The results recorded a mean score of 4.0 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the water service providers have constituted resource control teams. Item eleven assessed whether the resource control teams have representation from all the departments. The results recorded a mean score of 3.8 and a standard deviation of 1.1. The study found out that the respondents agreed with the fact that the resource control teams have representation from all the departments. Item twelve assessed the extent to which the members of the resource control teams give suggestions on resource allocation. The results recorded a mean score of 4.4 and a standard deviation of 0.8. The study found out that the respondents strongly agreed with the fact that the members of the resource control teams give suggestions on resource allocation.

The study computed the mean of means of the eleven items that extricated the level of application of strategy formulation. The mean of means was 3.5 and a standard deviation of 1.0. The results indicated that the level of application of strategy formulation was high. This implied that the organization was committed in the application of strategy formulation.

#### **4.6.2 Strategy Formulation and its Relationship with Access to Water and Sanitation Services in Kenya**

The second hypothesis was that there is no significant relationship between the application of strategy formulation and access to water and sanitation services in Kenya. Pearson product moment correlation coefficients were used to establish whether a relationship existed between

the application of strategy formulation and access to water and sanitation services. The correlation were deemed significant at a set value of 0.05 the results are presented in Table 4.22

**Table 4.23 Correlation Analysis of Strategy formulation and Access to Water and Sanitation Services**

	Access to Water & Sanitation (AWS)	Strategic Management (SM)
	1	
Access to Water & Sanitation (AWS)	0.00	.727**
	.727**	
Strategic Management (SM)	0.00	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Source: Data 2017

Application of strategic management had a high positive relationship with access to water and sanitation services ( $r=0.727$ ,  $p=0.00$ ). This implied that an increase in the application leads to an increase in access to water and sanitation services. The hypothesis was further tested using the simple regression model.

#### **4.6.3 Application of Strategy formulation and Access to Water and Sanitation Service**

The study tested the **Hypothesis two** that there is no significant influence of the application of strategic management on the access to water and sanitation services in Kenya. This was tested using a simple regression model i.e Equation 3.5.

The model represented a value of  $R^2$  which show the proportion of variation in dependent variable explained by the regression model. Table 4.18 show that the application of strategy

formulation had a coefficient adjusted  $R^2=0.59$  this indicates that 59% of the variation in access to water and sanitation service can be accounted for by the application of strategy formulation.

**Table 4.24 Application of Strategy formulation and Access to Water and Sanitation Services**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. Change	F
1	.727a	0.529	0.59	0.69	5.29	58.29	1	52	0.00	

Source: Data 2017

**Table 4.25 Coefficients of Influence Strategy Formulation and Access to Water and Sanitation Services**

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)		5.15E-17			1.00
SMP	0.727	0.11	0.727	6.61	0.00

Source: Data 2017

The results in Table 4.23 show that application of strategy formulation accounts for 72.7 % of the variation of access to water and sanitation services (Adjusted  $R^2=0.727$ ). The results show a statistical significance for the effect of strategy formulation on access to water and sanitation services ( $t= 7.6, p<0.00$ ). The study there for rejected the hypothesis that there is no significant influence of strategy formulation on access to water and sanitation services in Kenya. Therefore the hypothesis was rejected. This was in agreement with Ujunwa and Modebe (2012) who carried out a study on the adoption of strategic management approach in the capital market development in Nigeria. The study found out that strategic management approach ensured capital

market efficiency following its perceived pivotal role in economic development. The study noted that strategy formulation will not only promote the efficiency of the capital market, but will leverage its role in promoting economic growth. This also agreed with Muogbo (2013) who carried out a study on the effect of formal strategic management on organizational growth and development in 21 selected firms in Nigeria. The study found out that application of formal strategic management had a significant effect on the firms' competitiveness. Askarany and Yazdifar (2012) investigated the application of strategic management tools. The study found out that there is a significant association between the application of strategic management tools and organizational performance. The study therefore contributed to the body of knowledge by ascertaining that strategy formulation enhances the access to water and sanitation services which had not been assessed earlier.

#### **4.7 Moderating Effect of Strategy Formulation on the Relationship between Quality Management System Standards and Access to Water and Sanitation Services in Kenya**

The study tested the hypothesis that that there is no significant moderating influence of strategy formulation on the relationship between quality management standards and access to water and sanitation services. To test this hypothesis, the moderating effect was computed using the method proposed by Baron and Kenny (1986). A moderator is a variable that specifies conditions under which a given independent variable is related to an outcome. The moderating effect is measured in terms of how the effect of the explanatory variables changes when the moderator variable is introduced. The following hypothesis was formulated:

**H<sub>03</sub>:** There is no significant moderating influence of strategy formulation on the relationship between quality management system standards and access to water and sanitation services in Kenya. A three-step stepwise regression analysis was then used to test this hypothesis

Step 1: Dependent variable is regressed on the independent variable.

Step 2: Moderating variable is added to the regression equation.

Step 3: The interaction term between independent and moderator variables was introduced to the regression model. All the variables comprising quality management system, strategy formulation and the interaction term were entered in the regression model. To confirm the moderation, the interaction term should be significant ( $p < 0.05$ ). The results of stepwise regression predicting that the effect of quality management on access to water and sanitation services is moderated by strategy formulation are presented in Table 4.2.6

**Table 4.26 Model Summary of Influence Strategy Formulation on the relationship between Adherences to Quality Management System Standards**

<b>Model Summary</b>									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.922 <sup>a</sup>	.851	.848	.39003902	.851	296.385	1	52	.000
2	.974 <sup>b</sup>	.948	.946	.23137143	.098	96.775	1	51	.000
3	.976 <sup>c</sup>	.952	.950	.22453297	.004	4.154	1	50	.047

a. Predictors: (Constant), Adherence to quality management (AQM)

b. Predictors: (Constant), Adherence to quality management (AQM), Strategy Formulation (SF)

c. Predictors: (Constant), Adherence to quality management (AQM), Strategy Formulation (SF), AQM\*SF

d. Dependent Variable: Access to Water & Sanitation (AWS)

Source: Data 2017

**Table 4.27 Coefficients of Influence strategy Formulation on the relationship between Adherences to Quality Management System Standards**

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.506E-016	.053		.000	1.000
	Adherence to quality management (AQM)	.922	.054	.922	17.216	.000
2	(Constant)	-7.217E-017	.031		.000	1.000
	Adherence to quality management (AQM)	.745	.037	.745	20.390	.000
	Strategy Formulation (SF)	.359	.037	.359	9.837	.000
3	(Constant)	-.006	.031		-.197	.845
	Adherence to quality management (AQM)	.788	.041	.788	19.066	.000
	Strategy Formulation (SF) Strategy Formulation (SF)	.408	.043	.408	9.532	.000
	AQM*(SF)	.102	.050	.102	2.038	.047

a. Dependent Variable: Access to Water & Sanitation (AWS)

Source: Data 2017

The results in step 1, Table 4.24 show that quality management system alone accounts for 84.8% of the variation of access to water and sanitation services (Adjusted  $R^2=0.848$ ). In step 2, the results show that strategy formulation and quality management system account for 94.8% (Adjusted  $R^2=0.948$ ) of variations in access to water and sanitation services. In step 3, the result for quality management system and strategy formulation (quality management system \* strategy formulation) were included in the model to determine whether strategy formulation moderates the relationship between quality management system and access to water and sanitation services. The interaction term (quality management system and strategy formulation) accounted for 95.2% of the variations in access to water and sanitation services. The results in step 2 showed that when the interaction term was entered into the model, this led to an increase in access to water

and sanitation services as the variation increased from 0.851 to 0.952. This implied that quality management system, strategy formulation and the interaction term (quality management system \*, strategy formulation) causes variation of 95.2% on access to water and sanitation services.

The results show a statistical significance for the effect of quality management system on access to water and sanitation services ( $t = 17.26$ ,  $p = 0.00$ ). At step 2, the model of quality management system and access to water and sanitation services was statistically significant ( $t = 9.837$ ,  $p = 0.00$ ). In step 3, the overall model was statistically insignificant ( $t = 2.038$ ,  $p = 0.047$ ). Regression coefficients for the test of hypothesis three are presented in Table 4.24, the regression coefficient was significant at all the three steps of the analysis. Of importance is the fact that the effect of interaction term between quality management system and strategy formulation on access to water and sanitation services was significant ( $t = 2.038$ ,  $p = 0.047$ ), implying that for every unit change in interaction between level of adherence to quality management system standards and level of application of strategy formulation, there is a corresponding change in access to water and sanitation services. These results provided sufficient evidence to reject the hypothesis that there is no statistical significant influence of strategy formulation on the relationship between quality management system standards and access to water and sanitation services in Kenya. Therefore the hypothesis that there is a significant moderating influence of strategy formulation on the relationship between quality management system and access to water and sanitation services was accepted.

Many studies assessing the moderating effects have used other moderators rather than strategy formulation. Seedee (2012) carried out a study on moderating role of business strategies on the relationship between best business practices and firm performance. Data was collected from 169 Thai manufacturing firms. Descriptive statistics and hierarchical regression analysis were used to

analyze the data. The finding indicated that the relationship between best business practices and firm's performance could be influenced by business strategies. These findings concurred with the current study.

Sagwa, K'Obonyo and Ogutu (2015) did a study on moderating effect of competitive strategy on the relationship between employee outcomes and performance of firms listed on the Nairobi Securities Exchange. The study used cross sectional descriptive survey research design. Data was collected using a self-administered questionnaire, from a population of 60(100%) Nairobi Securities Exchange listed firms. Descriptive statistics, correlation and regression techniques were used to analyze the data. The results indicate that competitive strategy moderates the relationship between employee outcomes and firm performance.

Rosli & Rosman Mahmood (2013) carried out a study on moderating effects of human resource management practices and entrepreneur training on innovation and small-medium firm Performance. Two hundred eighty-four samples were obtained from small-medium firms in Malaysia. The study found that the employee training interacted with innovation and significantly influenced organization performance.

Seedee (2012), Sagwa, K'Obonyo & Ogutu (2015) and Rosli & Rosman Mahmood (2013) carried out studies on the influence of strategy aspects on the relationship between best business practices, employees outcome and entrepreneurial training and organization performance. These studies were different because as Seedee (2012) investigated the moderating role of best business strategies on the relationship between best business strategies and firms performance, Sagwa, K'Obonyo and Ogutu (2015) did a study on moderating effect of competitive strategy on the relationship between employee outcomes and performance and Rosli



& Rosman Mahmood (2013) carried out a study on moderating effects of human resource management practices and entrepreneur training on innovation and small-medium firm Performance. However the current study went further to investigate access to water and sanitation services in Kenya and strategy formulation as a moderator of the relationship between quality management system and access to water and sanitation services ,aspects that have not been addressed before.

The study found out that there is a slight statistically influence of strategy formulation on the relationship between quality management system and access to water and sanitation services. The theory of constraints stipulates that there are a few constraints that prevents an organization to realize its goals and objective .The quality management systems attempts to eliminate these constrains by setting standards on infrastructure, employees skills and operation efficiency which should be to adhered to for it to realize its objectives .The current study have established that organization can reinforce these attempts by formulating strategies that are in line with the quality management system.

The resource based theory stipulates that the competitiveness of a firm emanates from resources and capabilities from within a firm. These resources and capabilities within the firm in this study have been conceptualized as infrastructure,employee's skills and operational efficiency. The current study have further establish that the competitiveness of the firm can further be enhanced by formulating strategies that supports infrastructure development, development of the employees skills and enhance operational efficiency.

In practice the findings of this study have established that strategy formulation and quality management system accounts for the level of access to water and sanitation services. The

management of the water service providers should embrace strategy formulation as it magnifies the relationship between quality management system and access to water and sanitation services.

## **CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

This chapter presents a summary of the major findings, conclusions drawn from the findings, recommendations, limitations, and suggestions for further studies. The specific objectives of this study were to establish the relationship between level of adherence to quality management

system standards and access to water and sanitation services, establish the influence of strategy formulation on access to water and sanitation services and establish the moderating influence of strategy formulation on the relationship between quality management system standards and access to water and sanitation services in Kenya

## **5.1 Summary of Findings**

The first research objective of this study was to establish the influence of level of adherence to quality management system standards on access to water and sanitation in the water service providers. The study found out that the level of adherence to quality management system standards in the water service providers was high. The study also found out that the highest level of adherence to quality management system standards was on employees' skills followed by adherence to infrastructure standards and level of adherence to quality management system standards on operational efficiency was lowest. The study went further to establish the influence of level of adherence to quality management system standards on access to water and sanitation services in Kenya. The research found out that there was a strong positive relationship between adherence to quality management system standards and access to water and sanitation services. The research also found out that adherence to quality management standards on operational efficiency standards had the highest positive relationship with access to water and sanitation services, followed by level of adherence quality management standards on infrastructure standards, and adherence to quality management standards on employees skills had the lowest positive relationship with the access to water and sanitation services. Lastly the study found out that the influence of level of adherence to quality management system standards on access to water and sanitation services was statistically significant.

The second research objective of this study was to establish the influence of strategy formulation on access to water and sanitation services in Kenya. The study found out that strategy formulation had a strong positive relationship with access to water and sanitation services. Lastly the study found out that the influence of strategy formulation on access to water and sanitation services was statistically significant.

The third research objective of this study was to establish the moderating influence of strategy formulation on the relationship between the level of adherence to quality management system standards and access to water and sanitation services in Kenya. The study found out that when quality management system, strategy formulation and the interaction term (quality management system \*, strategy formulation) the effect of interaction term between quality management and strategy formulation on access to water and sanitation services was statistically significant. This implied that for every unit change in interaction between level of adherence to quality management system standards and level of application of strategy formulation, there is a corresponding change in access to water and sanitation services

## **5.2 Conclusions**

On the first objective the study concluded that the levels of adherence to quality management system standards have a statistically significant influence on the level of access to water and sanitation services in Kenya. On the second objective the study concluded that the level of application of strategy formulation was high. It also concluded that the influence of level of application of strategy formulation have a statistically significant influence on access to water and sanitation services in Kenya. On the third objective the study concluded that the strategy formulation moderates the relationship between level of adherence to quality management standards and access to water and sanitation services.

### **5.3 Recommendations**

Regarding the first objective which sought to establish the influence of level of adherence to quality management system standards on access to water and sanitation services in Kenya the study recommends that the management should make some efforts in enhancing the level of adherence to operational efficiency standards. To achieve this management should try to minimize the non-revenue water, reduce the number of employees per thousand connections and increase the revenue collection efficiency. There is also the need of increased investment on infrastructure development. The water service providers should there for make efforts in the development of the required infrastructure and align such infrastructural development with the quality management system standards. This study also recommends that water service providers should have professionals with the required level of skills and experience. They need to invest in capacity building and technical support in the areas of provision of water and sanitation services. The water service providers should also retain employees with the relevant skills for the implementation of the quality management system. The water service providers should also develop training and development programs that will equip the employees with therequired skills.

The second objective sought to establish the influence of strategy formulation on access to water and sanitation services. It's clear from the study findings that decisions on how water resources are protected, managed, used and conserved are strategic management issues. The study noted that water crises in Kenya are largely strategic management outcomes. The study therefore recommends that the water service providers should be guided by central water service strategic management standards. There is also need for developing sustainable strategic plan for all water service providers to improve the practical competence of water service providers. The water

service providers should also use of well-structured planning mechanism, have well written mission and vision, base decisions and actions on formulated organization policies and use resource control teams to ensure the access to water and sanitation services to its customers is enhanced .

The third objective sought to establish the moderating influence of strategy formulation on access to water and sanitation services. The study recommends that the management of the water service providers should align their strategy formulation with the quality management system to enhance access to water and sanitation services.

#### **5.4 Limitations of the Study**

The study was limited in terms of previous studies that could be used to compare the findings, there existed limited empirical studies that examined the moderating influence of strategy formulation on the relationship between quality management system and access to water and sanitation services. However the study was able to link the relationship of individual independent variables and access to water and sanitation services with findings of previous studies that examined similar or closely related variables such as performance and sustainability.

The other limitation concerns the source of the data. To establish the level of access to water and sanitation services the study relied on data from the water service providers although data from the customers seemed to be to be more reliable. To mitigate this limitation, the study used data submitted to WASREB during the 2016/2017 financial year which had well established mechanism of verifying the data obtained.

### **5.5 Suggestions for Further Studies**

The purpose of this study was to determine the influence of strategy formulation on the relationship between quality management system and on the access to water and sanitation services in Kenya. The study found that strategy formulation statically moderate the relationship between quality management system and access to water and sanitation services.

Future studies can explore the influence of other compliance management systems such environmental compliance management system and performance management system on access to water and sanitation services.

Other studies could also be undertaken to establish the moderating role other best management practices on the relationship between quality management system and access to water and sanitation services. Finally, other studies can be done in other sectors of the economy to establish how strategy formulation supplements the quality management system in enhancing business performance.

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## **APPENDIX 1: INTRODUCTION LETTER**

Dear Respondents

PhD student, Maseno University

### **SUBJECT: FILLING OF RESEARCH QUESTIONNAIRE**

I am a student at Maseno University pursuing a doctor of philosophy in business management. I am currently undertaking a research study on the moderating influence of strategic management

practice on the relationship between quality management system and access to water and sanitation services in Kenya

The questionnaire attached is meant for collecting data on information which will assist in the study. Kindly complete the questionnaire as faithfully as possible all the information given will be held in outmost confidence and will not be used for any other purpose other than for this study your positive response will highly appreciated

Yours faithfully

Edward Njoroge Mburu

## **APPENDIX 2: CHECK LIST FOR DATA COLLECTION IN THE WATER SERVICE PROVIDERS**

The purpose of the study is to establish the moderating Influence of Strategy formulation on the relationship between Quality Management System and Access to Water and Sanitation Services in Kenya. The findings of this study are purely for academic purpose. Confidentiality will be maintained and the findings will be used strictly for the purpose of the study.

### **Section A: General Background Information**

Name of the water service provider .....

Name of the water service board .....

County.....

Item	Type of Data	Year 2016/2017
1	Total Population in Service Area	
2	Total Population Served	
3	Total Number of Connections	
4	Total Area to be Covered	
5	Total Area Covered	
6	Total Number of Active Connections( Active +Inactive)	
7	Number of Towns Served	
8	Total Water Produced In M <sup>3</sup>	
9	Non-Revenue Water %	
10	Total Number of Staff	
11	Number of Staff Per 1000 Connections	
12	Drinking Water Quality	
13	Hours of Supply Per Day	

14	Water Coverage	
15	Sewerage Coverage	



## **APPENDIX 3: QUESTIONNAIRE FOR GENERAL MANAGERS OF THE WATER SERVICE PROVIDERS**

Title: Influence of Strategy formulation on the relationship between Quality Management System and Access to Water and Sanitation Services in Kenya.

The purpose of the study is to establish the moderating influence of Strategy formulation on the relationship between Quality Management System and Access to Water and Sanitation Services in Kenya. The findings of this study are purely for academic purpose. Confidentiality will be maintained and the findings will be used strictly for the purpose of the study. You are kindly requested to provide responses in the following questions.

### **Section A: General Background Information**

1. Name of the water service provider .....
2. Name of the water service board .....
3. County.....
4. Designation .....
5. When did your organization implement the quality management system? (Tick where appropriate)

Has not started the process	[ 1 ]
In the process of implementing the QMS	[ 2 ]
Two year ago	[ 3 ]
Three years ago	[ 4 ]
More than Three Years Ago	[ 5 ]

**Section B: Access to water and sanitation services**

6) Indicate the level of water coverage of your water service provider during 2016-2017 financial year.

Very Low [      ]

Low [      ]

Moderate [      ]

High [      ]

Very High [      ]

7) What general comment can you make about water coverage of your water service provider during 2016-2017 financial year.

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8) Indicate the level of sewerage coverage of your water service provider during 2016-2017 financial years

Very Low [      ]

Low [      ]

Moderate [      ]

High [      ]

Very High [      ]

9) What general comment can you make about sewerage coverage of your water service provider during 2016-2017 financial year.

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.....

10) Indicate the quality of drinking water of your water service provider during 2016-2017 financial year

Very Low [       ]

Low [       ]

Moderate [       ]

High [       ]

Very High [       ]

11) What general comment can you make about the quality of drinking water of your water service provider during 2016-2017 financial year?

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12) Indicate the hours of water supply per day to customers of your water service provider during 2016-2017 financial year.

Very Low [       ]

Low [       ]

Moderate [       ]

High [       ]

Very High [       ]

13) What general comment can you make about the hours of water supply per to customers of your water service provider during 2016-2017 financial year.

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**Section C: Adherence to Infrastructure Standards**

Indicate the extent to which you agree with the following statements (Tick Where appropriate)

14. To what extent do you agree with the following statements on the adherence to infrastructure standards during 2016/2017 financial year.? Please select the appropriate response for the following questions using the following rating scale.

Strongly agree [5]

Agree [4]

Not sure [3]

Disagree [2]

Strongly disagree [1]

<b>Adherence to Infrastructure Standards</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
The production capacity of the water service provider is in line with the quality management system Standards					
The QMS audit did not detect any none conformity on adherence to production capacity Standards					
The water service provider has adequately implemented the QMS requirements on production capacity Standards					
The connections of the water service provider are in line with the quality management system Standards					
The QMS audit did not detect any none conformity on adherence to connections Standards					

The water service provider has adequately implemented the QMS requirements on connections Standards					
The storage capacity of the water service provider is in line with the quality management system Standards					
The QMS audit did not detect any none conformity on adherence to storage capacity Standards					
The water service provider has adequately implemented the QMS requirements on storage capacity Standards					
The water service provider has adequately implemented the QMS requirements on sewerage infrastructure Standards					
The QMS audit did not detect any none conformity on adherence to sewerage infrastructure Standards					
The water service provider has adequately implemented the QMS requirements on sewerage infrastructure Standards					

15. Explain in your own words how you feel about the level of adherence to infrastructure standards of your water service provider during 2016-2017 financial year.

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**Section D: Adherence to Employee’s Skills Standards**

16. To what extent do you agree with the following statements on the adherence to employees skills standards during 2016-2017 financial year? Please select the appropriate response for the following questions using the following rating scale.

- Strongly agree [5]
- Agree [4]
- Not sure [3]
- Disagree [2]
- Strongly disagree [1]

<b>Adherence To Employees Skills Standards</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
The employees qualifications of the water service provider are in line with the quality management system Standards					
The QMS audit did not detect any none conformity on adherence to employees qualifications Standards					
The water service provider has adequately implemented the QMS requirements on employees qualifications Standards					
The employees experience of the water service provider are in line with the quality management					

system Standards					
The QMS audit did not detect any none conformity on adherence to employees experience Standards					
The water service provider has adequately implemented the QMS requirements on employees experience					
The training and development programs of the water service provider are in line with the quality management system Standards					
The QMS audit did not detect any none conformity on adherence to training and development programs Standards					
The water service provider has adequately implemented the QMS requirements on training and development programs					

17. Explain in your own words how you feel about the level of adherence to Employees Skills Standards of your water service provider during 2016-2017 financial year.

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**Section E: Adherence to Operational Efficiency Standards**

18. To what extent do you agree with the following on the adherence to operational efficiency standards during 2016-2017 financial year? Please select the appropriate response for the following questions using the following rating scale.

Strongly agree [5]

Agree [4]

Not sure [3]

Disagree [2]

Strongly disagree [1]

<b>Adherence To operational efficiency standards</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
The water service provider efforts to reduce none revenue water are in line with the quality management system Standards					
The QMS audit did not detect any none conformity on adherence to none revenue water Standards					
The water service provider has adequately implemented the QMS requirements on none revenue water					
The water service provider ratio of employees to connections are in line with the quality management system Standards (labour productivity)					



The QMS audit did not detect any none conformity on adherence to ratio of employees to connections Standards					
The water service provider has adequately implemented the QMS requirements on labour productivity Standards					
The water service provider revenue collection efficiency is in line with the quality management system Standards					
The QMS audit did not detect any none conformity on revenue collection efficiency Standards					
The water service provider has adequately implemented the QMS requirements on revenue collection efficiency Standards					

19. Explain in your own words how you feel about the level of adherence to operational efficiency Standards of your water service provider during 2016-2017 financial year.

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**Section E: Application of Strategy formulation**

20. To what extent do you agree with the following statements on the application of strategy formulation in your water service provider during 2016-2017 financial year.? Please select the appropriate response for the following questions using the following rating scale.

Strongly agree [5]

Agree [4]

Not sure [3]

Disagree [2]

Strongly disagree [1]

<b>Application of Strategy formulation</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
The water service provider has a well written mission and vision					
All the stakeholders of the organization understands the organizations mission and vision					
The water service provider mission and vision are well displayed in strategic places in the organization					
The organization has well developed plans of activities					
The organization uses well-structured planning mechanism					
The water service provider adheres to its plan of activities					

The water service provider has well formulated organization policies					
The water service provider base its decisions and actions on formulated organization policies					
The water service provider adheres to its formulated organization policies					
The organization has constituted resource control teams					
The resource control teams has representation from all the departments					
All the members of the resource control teams give suggestions on resource allocation					

21. Explain in your own words how you feel about the application of strategy formulation in your water service provider during 2016-2017 financial year.

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## APPENDIX 4: GENERAL DATA FOR WATER SERVICE PROVIDERS

Utility	in Service Area	Total	Total no.of connections	Total no. of connections	No. of connections	Total water	Domestic+K	Total billed	Non-	Production	Consumption	No. of total
Nairobi	3,891,490	3,157,667	564,834	525,372	175	201,861	79,515	124,388	38	175	69	2,948
Eldoret	408,215	295,651	95,915	77,893	25	12,857	5,606	7,059	45	119	52	265
Mombasa	1,071,656	573,585	87,338	43,065	17	15,372	5,629	7,138	54	73	27	382
Nakuru	462,043	415,999	53,712	47,388	40	12,152	5,232	7,602	37	80	34	234
Thika	214,533	204,951	45,607	40,131	11	11,680	4,322	7,885	32	156	58	216
Kisumu	414,885	280,462	42,305	42,095	59	10,164	4,858	5,140	49	99	47	285
Nyeri	147,484	133,742	36,608	31,709	19	5,577	3,259	4,577	18	114	67	105
Kakamega Busia	411,131	298,070	35,628	27,118	66	4,742	2,005	2,229	53	44	18	162
Nzoia	423,002	347,882	34,779	30,776	62	6,960	1,874	4,001	43	55	15	198
Kirinyaga	444,103	125,814	27,316	16,649	14	5,737	1,772	2,057	64	125	39	161
Kilifi Mariakani	824,180	319,624	26,696	16,281	39	7,843	1,844	4,120	47	67	16	226

Othaya Mukurweini	178,2 69	127, 995	25,639	16,00 6	1	97	6,05 9	1,863	2,23 8	63	130	40	107
Embu	181,9 51	124, 589	24,025	22,32 0	2	24 7	6,33 7	2,750	3,24 9	49	139	60	105
Mathira	149,9 51	53,5 64	23,679	10,95 6	1	94	4,17 3	858	1,60 0	62	213	44	65
Malindi	295,0 62	233, 334	23,094	20,89 9	1	33 4	6,31 7	3,601	4,62 1	27	74	42	130
Murang'a South	485,4 75	193, 680	22,086	17,73 5	1	91	6,09 6	1,961	2,10 7	65	86	28	128
Gatundu	148,4 10	119, 298	21,336	17,90 8	1	68	3,98 2	1,834	2,39 2	40	91	42	89
Nakuru Rural	462,0 22	106, 226	21,179	8,952	1	16 0	8,35 6	1,405	2,89 2	65	216	36	142
Kericho	175,6 26	98,7 80	20,491	17,45 4	4	14 8	2,83 0	1,263	1,58 2	44	79	35	136
Gusii	723,4 34	267, 409	20,111	16,40 0	7	78	1,86 7	968	1,16 2	38	19	10	128
Nanyuki	89,50 6	84,4 08	19,403	19,29 6	1	24 7	4,01 2	1,417	2,61 8	35	130	46	78
Kahuti	160,7 09	67,6 91	17,636	8,234	1	55	3,44 0	1,216	585	83	139	49	87
Nyahururu	76,67 6	61,7 10	15,357	14,24 3	1	13 6	2,64 6	634	1,42 9	46	117	28	113
Ruiru-Juja	188,9 35	145, 548	15,041	14,87 8	2	16 4	2,69 8	1,936	1,93 6	28	51	36	47

Kwale	302,9 65	233, 272	14,533	8,627	1	11 3	2,13 7	1,826	1,40 6	34	25	21	131
Tetu	75,30 1	43,3 67	14,405	11,31 6	1	55	2,34 5	1,184	1,25 3	47	148	75	79
Tavevo	63,04 6	48,1 75	14,010	9,134	3	14 5	4,75 2	1,932	2,36 7	50	270	11 0	119
Imetha	392,9 98	122, 389	13,952	6,945	1	38	n.c.d	1,525	n.c. d	n.c. .d	n.c. d	34	136
Murang'a	80,66 8	57,5 16	13,894	12,20 3	1	11 9	2,06 4	733	1,28 1	38	98	35	108
Bomet	117,0 00	88,2 54	12,497	8,299	1	53	2,81 5	1,001	1,47 2	48	87	31	68
Meru	137,0 22	77,7 47	12,368	10,61 1	2	15 4	2,53 9	2,193	2,04 6	19	89	77	92
Ngandori Nginda	96,17 4	72,7 40	12,288	10,04 1	1	37	n.c.d	1,075	n.c. d	n.c. .d	n.c. d	41	66
Sibo	419,6 82	142, 069	11,886	6,275	5	58	2,19 1	660	1,03 7	53	42	13	84
Mavoko	186,1 13	123, 137	11,074	9,416	1	17 7	1,71 1	664	917	46	38	15	80
Kitui	738,3 34	246, 236	10,993	7,911	1	94	2,86 4	719	989	65	32	8	76
Garissa	152,9 31	94,7 90	10,943	10,85 3	1	17 7	5,54 4	1,888	2,50 4	55	160	55	115
Oloolaiser	299,2 61	126, 539	9,979	6,996	3	13 7	2,51 9	1,445	1,58 7	37	55	31	101

Kikuyu	295,2 93	103, 985	9,945	6,330	1	65	1,49 0	749	827	44	39	20	56
Gatamathi	133,8 22	47,8 32	9,932	6,937	1	46	2,80 7	637	878	69	161	37	57
Nithi	81,63 0	65,3 38	9,722	6,706	1	39	1,15 7	545	647	44	48	23	51
Ngagaka	73,22 9	70,5 89	9,531	6,276	1	29	1,07 6	457	560	48	42	18	41
Machakos	216,7 30	122, 913	9,038	6,179	2	98	1,10 4	543	573	48	25	12	60
Isiolo	63,32 5	36,9 82	8,874	7,663	1	70	1,25 8	562	837	34	93	42	54
Tilibei	182,6 28	118, 512	8,541	3,796	1	30	1,31 0	293	603	54	30	7	47
Karimenu	96,75 7	61,6 03	8,412	7,001	1	52	3,04 7	1,249	1,33 8	56	136	56	49
Kyeni	81,68 9	18,3 81	8,080	4,408	1	18	1,04 0	381	381	63	155	57	33
Tuuru	313,5 92	130, 001	7,928	4,011	1	20	1,39 1	363	448	68	29	8	59
Limuru	241,2 65	109, 632	7,908	7,557	1	92	1,28 7	703	876	32	32	18	53
Githunguri	197,8 16	18,3 18	7,140	3,299	1	41	922	329	472	49	138	49	35
Amatsi	235,9 58	38,4 79	7,029	3,204	2	25	1,62 4	537	953	41	116	38	61

Lodwar	66,49 8	32,7 15	6,947	6,630	2	41	1,26 9	114	756	40	106	10	58
Kiambu	101,3 90	37,7 73	6,925	5,843	1	90	1,62 9	1,049	1,05 1	35	118	76	51
Nol Turesh Loitokitok	217,0 96	36,2 52	6,871	3,490	1	92	4,37 5	1,004	1,06 3	76	331	76	86
Kibwezi Makindu	285,5 30	102, 784	6,061	5,250	1	56	1,40 6	814	1,00 8	28	37	22	56
Karuri	147,4 40	73,4 23	5,461	5,001	1	66	1,,19 9	813	902	25	45	30	34
Embe	47,3 03	20,26 8	4,610	2,438	1	25	756	312	397	48	102	42	20
Nyandarua	64,5 43	8,639	4,372	1,898	1	13	379	166	190	50	120	53	33
Murugi Mugumango	32,9 07	19,97 5	4,160	4,091	1	12	2,87 4	1,469	1,91 9	33	394	20 1	29
Eldama Ravine	36,,0 38	16,37 7	3,956	1,717	1	14	1,00 0	240	298	70	167	40	31
Lamu	22,6 30	16,44 1	3,890	2,751	1	23	606	440	365	40	101	73	32
Mikutra	163, 630	26,77 3	3,718	2,339	3	20	593	78	164	72	61	8	65
Kiambere Mwingi	424, 022	63,20 1	3,408	2,088	2	55	758	288	397	48	33	13	44
Kapsabet Nandi	153, 975	90,81 6	2,807	2,442	1	83	1,00 6	363	448	56	30	11	51



Naivasha	153,975	90,816	2,807	2,442	1	83	1,006	363	448	56	30	11	51
Olkejuado	50,763	4,691	2,798	807	1	14	n.c.d	166	n.c.d	n.c.d	n.c.d	97	20
Kapenguria	78,715	15,799	2,680	1,286	1	10	305	107	223	27	53	18	30
Muthambi 4k	22,458	19,812	2,425	2,423	1	10	753	447	568	24	104	62	17
Yatta	160,557	15,481	2,218	2,138	1	8	n.c.d	153	n.c.d	n.c.d	n.c.d	27	26
Iten Tambach	52,573	10,800	2,108	1,788	1	14	419	164	258	38	106	42	26
Narok	67,832	22,065	2,090	1,853	1	41	727	173	413	43	90	21	37
Olkalou	84,618	27,040	2,031	1,419	1	20	431	127	162	63	44	13	16
Ndaragwa	14,714	13,459	2,025	1,345	1	3	156	42	76	51	32	9	24
Rukanga	6,355	7,101	1,957	1,701	1	5	360	123	146	59	139	48	20
Kikanamku	49,477	19,196	1,729	1,464	1	n.c.d	392	168	235	40	56	24	11
Namanga	19,324	11,400	1,680	1,603	1	8	n.c.d	216	n.c.d	n.c.d	n.c.d	52	11
Maralal	40,779	10,042	1,680	1,443	1	10	335	198	206	38	91	54	33

Mbooni	64,1 23	14,72 0	1,257	1,044	1	3	n.c.d	5	n.c. d	n.c. .d	n.c. d	1	20
Engineer	16,5 31	9,452	1,167	1,152	1	3	n.c.d	320	n.c. d	n.c. .d	n.c. d	93	8
Wote	71,7 86	11,41 4	1,148	1,101	1	19	n.c.d	57	n.c. d	n.c. .d	n.c. d	14	20
Runda	11,6 48	10,38 0	1,130	1,125	1	94	909	610	620	32	240	16 1	30
Moyale	47,8 68	10,48 3	1,093	857	1	n. c. d	n.c.d	75	n.c. d	n.c. .d	n.c. d	20	30
Nyakanja	25,7 38	10,08 4	1,084	981	1	4	158	57	68	57	43	16	7
Kiamumbi	9,58 0	9,067	1,025	931	1	14	249	158	159	36	75	48	9
Nyasare	98,2 78	22,23 3	1,024	753	1	5	138	44	86	38	17	5	11
Matungulu Kangundo	238, 370	7,269	900	532	1	13	166	76	93	44	63	29	10
Tachasis	26,4 05	14,67 3	733	733	1	2	298	160	210	29	56	30	12
Totals	20,3 82,8 63	11,12 6,951	1,696, 700	1,372, 887	13 2	16 ,5 86	429, 085	172,9 16	243, 768	43 *	106 *	43 *	9,49 4

Source: WASREB 2017

## APPENDIX 5: COMPONENTS OF DRINKING WATER QUALITY

Utility	Compliance (%)	DWC			Bacteri	UTILITY			DWC	Bacteri				
		D	W	Q		D	W	Q						
Nairobi	93	93			93				Tilibei	64		46		53
Eldoret	94	96			95				Karimenu	74		40		53
Mombasa	61	73			68				Kyeni	96		-		38
Nakuru	93	96			95				Tuuru	-		83		50
Thika	96	95			95				Limuru	89		95		93
Kisumu	94	96			95				Githunguri	67		62		64
Nyeri	96	96			96				Amatsi	96		91		93
Kakamega Busia	95	96			95				Lodwar	48		51		50
Nzoia	95	95			95				Kiambu	94		96		95
Kirinyaga	96	96			96				Nol Turesh Loitokitok	96		35		59
Kilifi Mariakani	74	51			61				Kibwezi Makindu	96		56		72
Othaya Mukurweini	94	96			95				Karuri	-		39		24
Embu	84	96			91				Embe	95		96		96
Mathira	75	95			87				Nyandarua	84		-		34
Malindi	93	71			79				Murugi Mugumango	-		37		22
Muranga South	86	64			73				Eldama Ravine	94		93		94
Gatundu	94	50			68				Lamu	96		96		96
Nakuru Rural	85	83			84				Mikutra	96		96		96
Kericho	96	96			96				Kiambere Mwingi	78		61		68
Gusii	45	94			74				Kapsabet Nandi	96		56		72
Nanyuki	96	95			96				Naivasha	57		95		80
Kahuti	93	40			61				Olkejuado	33		50		43

Nyahururu	96	96	96	Kapenguria	95	24	52
Ruiru-Juja	95	95	95	Muthambi 4k	37	43	40
Kwale	83	78	80	Yatta	46	96	76
Tetu	74	63	67	Iten Tambach	80	87	84
Tavevo	73	48	58	Narok	96	50	68
Imetha	94	43	63	Olkalou	-	48	29
Muranga	96	91	93	Ndaragwa	-	-	-
Bomet	94	96	95	Rukanga	95	35	59
Meru	96	95	95	Kikanamku	-	-	-
Ngandori Nginda	96	96	96	Namanga	62	-	25
Sibo	90	95	93	Maralal	96	96	96
Mavoko	90	95	93	Mbooni	34	54	46
Kitui	95	95	95	Engineer	-	-	-
Garissa	89	89	89	Wote	91	88	89
Oloolaiser	96	96	96	Runda	95	95	95
Kikuyu	40	73	60	Moyale	59	58	59
Gatamathi	78	80	79	Nyakanja	-	61	37
Nithi	95	96	96	Kiamumbi	96	50	68

Source:WASREB 2017

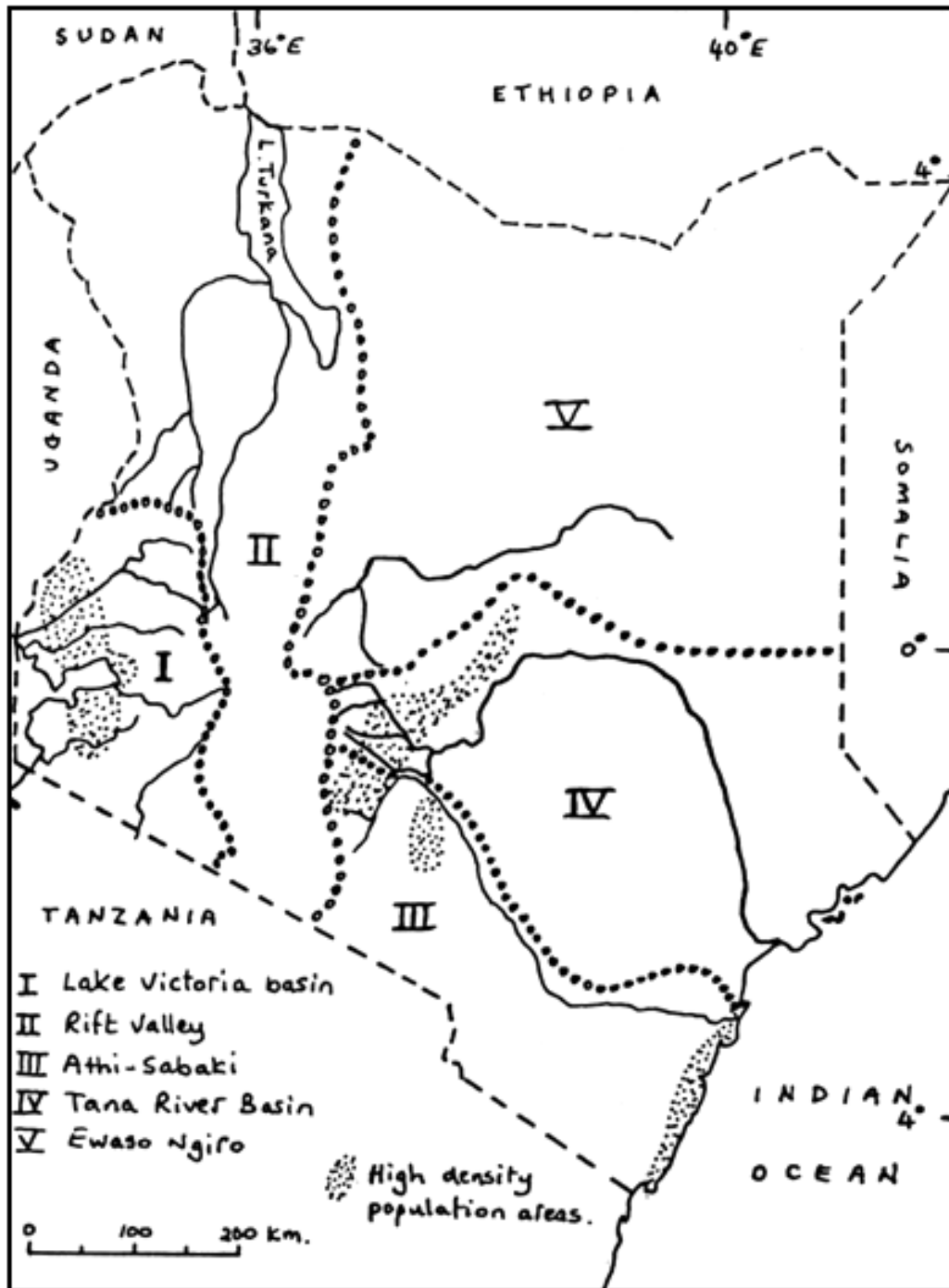
## APPENDIX 6: LIST OF WATER SERVICE PROVIDERS IN KENYA

- |                       |                     |                     |
|-----------------------|---------------------|---------------------|
| 1. Nairobi            | 30. Meru            | 59. Mikutra         |
| 2. Eldoret            | 31. Ngandori Nginda | 60. Kiambere Mwingi |
| 3. Mombasa            | 32. Sibbo           | 61. Kapsabet Nandi  |
| 4. Nakuru             | 33. Mavoko          | 62. Naivasha        |
| 5. Thika              | 34. Kitui           | 63. Olkejuado       |
| 6. Kisumu             | 35. Garissa         | 64. Kapenguria      |
| 7. Nyeri              | 36. Oololaiser      | 65. Muthambi 4k     |
| 8. Kakamega Busia     | 37. Kikuyu          | 66. Yatta           |
| 9. Nzoia              | 38. Gatamathi       | 67. Iten Tambach    |
| 10. Kirinyaga         | 39. Nithi           | 68. Narok           |
| 11. Kilifi Mariakani  | 40. Ngagaka         | 69. Olkalou         |
| 12. Othaya Mukurweini | 41. Machakos        | 70. Ndaragwa        |
| 13. Embu              | 42. Isiolo          | 71. Rukanga         |
| 14. Mathira           | 43. Tilibeii        | 72. Kikanamku       |
| 15. Malindi           | 44. Karimenu        | 73. Namanga         |
| 16. Murang'a South    | 45. Kyeni           | 74. Maralal         |
| 17. Gatundu           | 46. Tuuru           | 75. Mbooni          |

18. Nakuru Rural	47. Limuru	76. Engineer
19. Kericho	48. Githunguri	77. Wote
20. Gusii	49. Amatsi	78. Runda
21. Nanyuki	50. Lodwar	79. Moyale
22. Kahuti	51. Kiambu	80. Nyakanja
23. Nyahururu	52. Nol Turesh Loitokitok	81. Kiamumbi
24. Ruiru-Juja	53. Kibwezi Makindu	82. Nyasare
25. Kwale	54. Karuri	83. Matungulu Kangundo
26. Tetu	55. Embe	84. Tachasis
27. Tavevo	56. Nyandarua	85. Lamu
28. Imetha	57. Murugi Mugumango	86. Bomet
29. Murang'a	58. Eldama Ravine	

Source: WASREB 2017

## APPENDIX 7: A MAP OF KENYA SHOWING THE WATER DRAINAGE BASINS




Source: Kenya Mapping Association

# APPENDIX 8: RESEARCH PERMIT

**THIS IS TO CERTIFY THAT:**  
**MR. EDWARD NJOROGE MBURU**  
**of MASENO UNIVERSITY, 1957-10101**  
**karatina, has been permitted to conduct**  
**research in All Counties**  
**on the topic: EFFECT OF STRATEGIC**  
**MANAGEMENT PRACTICES ON THE**  
**RELATIONSHIP BETWEEN QUALITY**  
**MANAGEMENT SYSTEM AND ACCESS TO**  
**WATER AND SANITATION SERVICES**  
**for the period ending:**  
**19th June, 2018**  
**Applicant's**  
**Signature**

**Permit No : NACOSTI/P/17/64129/17476**  
**Date Of Issue : 3rd July, 2017**  
**Fee Received :Ksh 2000**



**Director General**  
**National Commission for Science,**  
**Technology & Innovation**

**ORIGINAL**  
**OFFICIAL RECEIPT**  
**AC: 15633**  
**Station: Nairobi Date: 27/06/2017**  
**RECEIVED from: Edward Njoroge Mburu**  
**Shillings: Two Thousand Shillings Only**  
**Cents: Nil**  
**on account of: Personal Distinct**  
**Vote Commission: 103**  
**Head Commission: 103**  
**USD: \_\_\_\_\_**  
**Kshs: 2,000/-**  
**AC: \_\_\_\_\_**  
**Item: AIA**  
**Cash: Direct deposit (Platinum)**  
**Cheque No: \_\_\_\_\_**  
**Signature of Officer receiving remittance**