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**FACTORS AFFECTING SERVICE DELIVERY AMONG WATER COMPANIES  
IN KENYA: A CASE STUDY OF GARISSA WATER AND SEWERAGE COMPANY**

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**D133/PT/CTY/13578/2009**

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## DECLARATION

This research project is my original work and has never been presented for a degree award in any university.

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## **DEDICATION**

I dedicate this research project to my late beloved parents who gave me a helping hand when I was a little young boy and pulled me up and the rest of my family members. Their prayers and support was a great encouragement to me in the entire research process.

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## OPERATION DEFINITION OF TERMS

**Customer meter inaccuracies:** These are faulty readings from the apparatus installed for purposes of measuring the quantity of water through the identified pipes

**Illegal connections:** The connections done without authorizations from GAWASCO

**Reservoir overflow:** The amount of water that is lost due to overfilling of water storage facilities

**Unaccounted for water:** Unaccounted for water is the difference between the amount of water produced, or purchased, and the amount of water sold to all customers. Unaccounted-for water includes underground leakage; unauthorized use; unavoidable leakage, inaccurate master, industrial, commercial and domestic meters; and unusual causes .

**Un-metered connections:** Water connections that are charged at a flat monthly rate without consideration of the amount of water use

**Water loss:** This is the difference between the water pumped into the supply system and the water that is used or sold to customers or used for water system operations. .

**Water Pollution:** in pure water that is un-save to drink

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## LIST OF ACRONYMS

Chap	- Chapter
GAWASCO	- Garissa Water and Sewerage Company
Kshs	- Kenya Shillings
IWA	- International Water Association
GoK	- Government of Kenya
KU	- Kenyatta University
MWI	- Ministry of Water and Irrigation
NGO	- Non-governmental organization
NRW	- Non Revenue Water
NWSB	- Northern Water Services Board
SPAs	- Service Provision Agreements
SPSS	- Statistical Package for Social Sciences
UFW	- Unaccounted For Water
WSB	- Water Service Board
WSPs	- Water Service Providers

## ABSTRACT

Lack of access to safe drinking water and sanitation services is worldwide problem that results in the death of four million people annually. More than 30% of common re-current diseases are water and sanitation related and most of those affected are found in Africa. Therefore, the purpose of the study was to investigate the factors affecting service delivery among water and sewerage companies in Kenya. The study specifically sought to establish the extent to which unaccounted for water, employees' level of training, management styles, water pollution and existing water infrastructure affect the operations of Garissa water and Sewerage. The design was descriptive; the target population was 160 employees of Garissa water and Sewerage Company. However, a sample of 47 respondents was selected using stratification and random sampling techniques. Data was analyzed using both qualitative and quantitative techniques.

The findings revealed that the main factors affecting Garissa water and Sewerage management were unaccounted for water mainly due to illegal water connections, pipe bursts and leakages. In addition, other factors included water pollution which was caused by human/livestock waste, siltation and sedimentation as well as financial constraints, political interference, lack of skilled man-power, corruption in the company and inefficient billing system.

The study recommends that implementation of a surveillance system to help the management identify the illegal water connections and alert it on bursts and leakages for prompt repairs. There is need for monitoring and ensuring the billing system is fully computerized to ensure efficiency in the water distribution system.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Worldwide, 1.1 billion people lack access to safe water while 2.4 billion people lack access to basic sanitation services. Four million people die annually as a result of this lack access to safe drinking water and sanitation services. More than 30% of common recurrent diseases are water and sanitation related. Most of those affected are found in Africa (World Bank, 2005). In Kenya, most of those affected are found in urban areas as a result of high urban population growth, that is, over 5 % annually due to rapid rural-urban migration (GoK, 2005).

The water sector in Kenya is guided by various policies and guidelines both prior to and after independence. Water Ordinance of 1929 followed The Water Act Cap 372 of 1952 . A comprehensive review of the water sector known as the National Water Master Plan was undertaken in 1992 which recommended the amendment of the Water Act Cap 372, the principal legal instrument governing the water sector till then. Subsequently, the government initiated the National Policy on Water Resources Management and Development in 1999. Major reforms in the water sector were initiated in 2002 with the revision of the Water Act. The Act defined clear roles for the different actors involved in the decentralized institutional framework that separates policy formulation from regulation and services provision (Ngigi and Macharia, 2006).

In principle, the Water Act 2002 was a comprehensive document that put in place radical changes to the legal and institutional framework for the management of the water sector in Kenya. The reforms initiated were mainly in four thematic areas. These included; separation of the management of water resources from the provision of water, separation of policy making from direct service provision and regulation, Decentralisation of functions to lower level state organs and involvement of stakeholders such as non-governmental organizations in the management of water resources and in the provision of water services.

The Water Services Boards (WSB) is responsible for ensuring that water and sewerage services are efficiently provided in their areas through appointed water service providers (WSP). Water Services Boards are holders of all water supply and related assets owned by the central government (GoK, 2002). The various Water Service Boards (WSB) have the responsibility of appointing and contracting Water Services Provider (WSPs) to operate and manage the water supply infrastructure in commercial and sustainable ways for efficient water supply service delivery. The WSPs usually include local authorities, NGOs, public trustees, public companies (under the Companies Act Cap 486) and societies/associations who sign Service Provision Agreements (SPAs) with the WSBs.

Northern Water Services Board (NWSB) is one of the eight water service board that was created under the new Water Act 2002.

### **1.1.1 Garissa town**

Garissa is a town in North Eastern Province, Kenya. It is the capital of the province and Garissa District. It has a population of 91,881 (as per 3% growth projected of 1999 census).

The Tana River flows through the city of Garissa which is the main source of water. It is located at around 0°27'25"S, 39°39'30"E.

Garissa Water Supply falls within the area of Northern Water Services Board (NWSB) and is managed by the Garissa Water and Sewerage Company (GAWASCO). GAWASCO is registered as a public limited liability company under In line with the requirements of the reforms in the water sector; NWSB has appointed and signed SPAs with Garissa Water and Sewerage Company (GAWASCO). GAWASCO has a performance contract that stipulates benchmarks to be achieved within stipulated periods. Performance contracts take different forms and have the incentive for improving efficiency in performance of a given business and they establish performance targets which can readily be measured.

Garissa town is served by the Garissa Urban Water Supply system whose design capacity is 25,000m<sup>3</sup>/day with a design period of up to the year 2025. The daily production that adequately serves the town ranges from 8000-9000 m<sup>3</sup>/day. The water supply's source is River Tana and serves an estimated area of 64 Km<sup>2</sup> and extends to Madogo division in the neighboring district of Tana River. GAWASCO is now mandated to operate and manage Garissa water supply for efficient service delivery.

This study sought to establish the extent to which the various independent variables namely unaccounted for water, employees training, management style, water pollution and water infrastructure affect the dependent variable that is service delivery and will come up with policy recommendations aimed at mitigating the identified challenges.

## 1.2 Statement of the Problem

According to UNDP report (2006) Sub-Saharan Africa lags behind the rest of the world with respect to achieving the Millennium Development Goals (MDGs) on water supply and sanitation, which aim to halve the proportion of people without access to safe drinking water and basic sanitation by 2015. While some impressive progress towards meeting the MDGs is noted, the continent, as a whole, still requires more focused efforts towards meeting the global targets. Most African countries have developed plans to reach the MDGs on water supply and sanitation (WSS), but these often exist as documents, and are neither country-owned nor actively implemented (UNDP, 2006).

Africa is facing an ongoing, endemic water and sanitation crisis that debilitates and kills large numbers of people and thus limiting economic growth, educational access, and life opportunities. Most at risk are the poor, especially women and children in rural areas and growing informal settlements in cities. Only 62 percent of Africans have access to safe water and 60% have access to adequate sanitation, the lowest rates in the world (World Bank, 2005).

In rural areas, home to 70 percent of Kenya's population, about 30 percent of water schemes have been handed over to or set up by CBOs GOK (2007). The number of such operations-especially those that can serve both domestic and irrigation needs-is expected to grow. However, innovations in treating water and purifying wastewater lag behind technical progress in many fields. A growing concern about pollution has led to greater government involvement in establishing standards of drinking water. In Kenya, provision of water services in major urban cities was initially done by the local government but due

to enormous task done by local authorities, provision of water services was inefficient and ineffective. This led the government to hand over this task to Commercial companies.

The commercial water and sewerage companies were now charged with the responsibility of provision of water and sewerage management in the various parts of the country. However water and sewerage companies face numerous challenges. Despite the effort by most water and sewerage companies in the country to improve the supply and the quality of water, nearly nine out of ten consumers have some concerns about the supply and quality of their domestic water. The consumers complain of water contaminations and sediment in their water. Other factor affecting water and sewerage companies includes; water losses due to illegal water connections and leakages, water pollution especially during the rainy season, inadequate employees' training, poor water infrastructure and poor management of the water resources. All these factor impact negatively on the performance and quality of service delivery in the water and sewerage companies. Despite these factors, there is an increased demand for water services amongst the consumers hence the need to improve the physical water distribution system to ensure consumer satisfaction.

This study sought to establish the extent to which the above various factor affect the service delivery of water and sewerage in Kenya and come up with policy recommendations aimed at mitigating the identified challenges.

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

#### **1.3.1 General Objective**

The broad objective of this study is to investigate the factors affecting service delivery among water and sewerage companies in Kenya.

### **1.3.2 The specific objectives of this study are:**

1. To establish the extent to which the water losses affect the Service Delivery of Garissa water and Sewerage Company.
2. To assess the extent to which the employees level of training affect the service delivery of the company.
3. To establish the extent to which the management styles affect service delivery Garissa water and Sewerage Company.
4. To establish the extent to which the water pollution affects the service delivery of the company.
5. To examine the extent to which the existing water infrastructure affect service delivery of the water company.

### **1.4 Research Questions**

1. How does the water loss affect the operations of Garissa water and Sewerage Company?
2. Does the employees' level of training affect the service delivery of the company?
3. How does the management style employed by the management affect the company's service delivery?
4. Does water pollution affect the service delivery of the company?
5. How does the existing water Infrastructure impact on the service delivery of the company?

## **1.5 Significance of the Study**

This study will be useful to the government and other policy makers in policy formulation and implementation. Since water is an essential commodity in well being of the citizen, understanding the factor affecting the industry will be crucial to the government and other policy makers when designing strategies and setting up policy framework for the water industry regulation.

This study will also be useful to the management of water and sewerage companies in Kenya especially Garissa water and sewerage company their bid to understand the challenges peculiar to the company's operation thereby leading to seeking solutions to mitigate the identified challenges. This is expected to bring about efficiency hence improve service delivery to the consumers. The study will also assist the researchers and academicians.

## **1.6 Scope of the study**

The study was based in Garissa Municipality of North eastern Kenya. It focused on the operations of GAWASCO which is located in Garissa Municipality. The study targeted the employees of GAWASCO who formed the target respondents of this study. Due to the sensitive nature of the information sought, the study was faced with the problem of concealment of information by the respondents. They were suspicious of the motive of the study. To tackle these problems, the researcher obtained an introductory letter from the university detailing the purpose of the study to reduce suspicious among the respondent. This helped to increase the response rate.

## 1.7 Limitations of the Study

The study was limited by the fact that questionnaires were used to collect most of the data. The main limitation was lack of adequate literature materials in this area hence over reliance from unpublished conference materials and other secondary sources. Furthermore, there was a challenge of the correspondence who could have acted suspiciously hence refuse to cooperate. However, an explanation of the benefits of the research helped build a rapport.

Another limitation is that the researcher did not cover all the water companies in Kenya due to the different Socio-economic circumstances of different parts of the country and the limited available resources and time. This is why the researcher has chosen Garissa water Sewerage Company as case study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents a review of the related literature presented by various researchers, scholars, analysts and authors on the subject under study. The review covered various issues on the factor affecting water and sewerage management. The materials are drawn from several sources which are closely related to the theme and the objectives of the study.

#### **2.2 Factor Affecting Water and Sewerage Management.**

This section presents factors affecting service delivery in water and sewerage management in Kenya. Areas to cover include Unaccounted for water, Employees' Training, Management Styles, Water Pollution, Water Infrastructure and Service Delivery.

##### **2.2.1 Unaccounted for water**

Water loss is the difference between the water pumped into the supply system and the water that is used (sold to customers or used free). Water loss is a major challenge facing water and sewerage systems throughout the world. Very often than not, there are water transfer inefficiencies due to loss of substantial quantities of unaccounted water. This has made the role of small-scale providers of water services very crucial especially in the rural communities (GoK, 2007).

In Kenya small-scale providers of water services are no longer seen as merely temporary substitutes for formal utilities. In many developing countries governments and donors increasingly view them as long-term partners in the work to extend and improve water

services, particularly as governments accelerate efforts to meet water targets associated with the Millennium Development Goals (UNDP, 2006).

In Kenya the water and sewerage companies have installed meters to water connections which make it easier for customers to pay for the water according to consumption and in line with a set tariff. This is a complete departure from the old way of operation and management where flat rates were charged. In Garissa municipality, Garissa Water and Sewerage Company has put up water kiosks at high density areas from where all the communities (poor or rich) buy water at a rate of Kshs. 2.00 per a 20-litre (Jerri can) container. Previously the communities drawing water from one connection were required to pay a time related flat rate of Kshs. 30.00 per month per connection irrespective of the amount of water drawn. Every household with an individual connection paid for water according to the government set tariff structure Tariff for sewerage was 75% of the water bill for every household that was connected to the sewer system (GoK, 1999).

According to Johnson all water companies experience some water loss as an ordinary part of their operation (Johnson, 1995). Water loss is also called 'unaccounted -for water' (UFW) to distinguish it from losses that occur for known reasons, such as for water treatment processes and other processes that require the use of water. 'Unaccounted-for water' includes underground leakage, unauthorized use, unavoidable leakage, inaccurate meter, industrial, commercial and domestic meters, as well as errors in the billing process. Any water system must have a management plan in operation so that it can monitor and reduce UFW (Wyatt, 2002). Due to increased demand for water services there is pressure to reduce the physical losses in the distribution system (Takeru, 2004). There is therefore

need to formation of new strategies by water and sewerage companies to address water losses to improve the efficiency of water supply to the consumers.

### **2.2.2 Employees' Training**

Changes in staff behaviour do not occur automatically or overnight, so a series of targeted interventions must be made into each group. These may include workshops, training sessions, peer reviews and joint planning and implementation, as well as celebrations, soap-box speeches and Board member store visits. They should be designed according to the social and mental context of the group, something than can be diagnosed using tools such as deep-structure interviews and a range of questionnaires. To be successful, the interventions must be directly related to the groups' day-to-day tasks and continue over a significant period, (Kliger and Tweraser, 2001).

Staff training consists of both formal training events and on-the-job training (OJT). The importance of OJT is hard to overestimate, although at most firms it is organized haphazardly and therefore fails to realize its potential (Bowsher 1998; Rothwell and Kazanas 1994). The focus here is on formal training because this type of training is more closely related to staff rewards. Broadly, management can use staff training in two ways. In principle, training needs are identified through analysis of organizational needs and personal assessments. In the first, staff skills are improved so that employees are better able to do the particular jobs assigned to them, closing a "performance gap." This kind of training can also prepare staff for higher-level assignments in the future or help them take on a different assignment at a similar level of responsibility. This training will be usually driven by the organization's future business strategy (explicit or implicit) and the corresponding staff requirements, (Bowsher 1998; Ban, Faerman, and Riccucci 1992).

In personal assessments-based training, the training is geared more to increasing the human capital of the staff member; the training increases the employee's skills but the new skills may be only generally applicable to current or future assignments at the workplace. To create and maintain a training program, the organization must make adequate provision for the expense of training in its annual budget and develop a training plan (Bowsher, 1998).

### **2.2.3 Management Styles**

Having appropriate management systems is important in achieving the organization's objectives. Paisner suggests that emphasis should be placed on the overall management style (Paisner, 1999). For example, he argues that a 'participative' style of management and culture is preferred over 'paternalistic' or 'laissez-faire' styles as they do not allow the active contribution of the junior in the organization's management or planning. Proper running of an organization requires good and well articulated leadership skills in all aspects of the management. According to D'Souza leadership is one of the most important means of directing people D'Souza,(2003). It is the process by which an executive influences the work and behavior of subordinates in choosing and attaining specific objectives. A person is said to have an influence on others when they are willing to carry out his wishes and accept his advice or guidance. According to Van, leadership as the ability of a superior to influence the behavior of his subordinates and persuades them to follow a particular course of action Van, (1982). Adoption of poor leadership style by the management causes misunderstanding between employees. Supervisors view their employees and even the top management with suspicion and distrust, thus treating them as enemies. In return, employees lack respect for managers, resent their authoritarian style and resist their suggestions for change. This strained environment makes co-operation and teamwork difficult in performance of duties (Dessler, 2005).

#### **2.2.4 Water Pollution**

More than 35,000 people die each day throughout the world from disease caused by impure or lack of drinking water. That equals more than 12,000,000 per year or more than the per year total killed in each of the six years of World War II. The absence of clean drinking water and sanitation is one of the largest causes of death and loss of productivity throughout the world (WHO, 2004). Water is what sustains life, but the quality of that water must be clean. The quality of water is measured by the kinds and amounts of foreign materials in it and the effects it has on living things. The ecosystem has a very delicate balance. Bodies of freshwater have the ability to break down some waste products, but people create much more than the system can handle, throwing the ecosystem off balance. There are some imbalances caused by nature, such as salty terrains or springs too high in minerals to produce fish, but more often than not it is humans who pollute these waters. Human dump many chemicals and wastes into the rivers seas and ocean, causing problems to build up (Scott, 2004). Water Pollution comes from many different sources and can affect many different things. The effects of water pollution are not only devastating to people, but they can kill animals, fish, and birds. Furthermore, the effects of water pollution pose a serious threat to society today and in the future.

Normally, human waste goes through various treatment plants to become uncontaminated, but during heavy rain or storm, human waste can back up and overflow into rivers or the water supplies. This waste in most cases causes disease for it rob the water of oxygen which kills the living organisms that lives in the water. When rain runs off the land, it picks up dirt and silts and carries them into the water. When the dirt and silt (sediment) settle in the water body they enter, these sediments could keep sunlight from reaching aquatic plants, plants that live in and grow in the water. When the sun can't reach the

plants, they die. The sediments can also clog fish gills, and smother organisms that live on the bottom of the body of water (Stout, 2007).

To improve productivity and produce good quality products, water and sewer systems continually are challenged hence the need for new improved technology in water harvesting, treatment and storage. Developing and applying new technology in collecting, treating, and transporting drinking water requires expertise, a strong incentive system, sufficient research and development funding, and adequate operating funds (ibid). These requirements are often lacks in most of the water companies.

### **2.2.5 Water Infrastructure**

The greatest challenge in developing countries is to achieve a high level of economic development that is both sustainable and equitable. The achievement of sustainable and equitable economic development requires, in order of importance, that the societies to increase productivity, eliminate poverty and minimize the impact of economic activities on the environment. To achieve this, availability of constant and reliable supply of water is of essence (United Nations, 1999).

According to Webb and David (1999), water infrastructure has affected water supply not only in developing countries but also world over. In the US, there are over 700,000 miles of water and wastewater pipes, which is four times the mileage of the interstate highway system, and many of these pipes are old, some over 100 years. Some of the pipes installed in the 1920's and after World War II, were made of materials whose life expectancy is much shorter than the average of older piping. More than one-third of the utilities had 20% or more of their pipelines nearing the end of their useful life. Over 60% of the water and

wastewater utilities, especially public systems had practiced insufficient infrastructure rehabilitation and replacement (USGAO, 2002).

In Kenya inefficiencies in water distribution system due to poor state of water infrastructure results in massive loss of revenue hence the need for water and sewerage companies to develop methods to prevent the water losses in order to reduce operational costs. 10-20 percent loss allowance for UFW is considered as normal and anything more than 20 percent requires urgent attention and remedial action. Advances in technology should be able to reduce the UFW to less than 10 percent (Wyatt, 2002).

### **2.2.6 Service Delivery**

According to Pearce and Robinson, performance of an organization is influenced by both internal and external factors Pearce and Robinson,(2000). These factors are characteristics of the strategy, structure and business environment. Therefore proper management skills are necessary if the business is to succeed with good performance. Water loss is also referred to as non revenue water and is useful as a financial performance indicator of water systems efficiency in terms of revenue generation (Liemberger, 2002).

Key tasks of the water and sewerage companies are to effectively and efficiently provide water and sewerage services to the citizens as set out in the national development policy framework and the specific sector policy framework (Marope, 1997). The management should ensure that their employees are well motivated to enhance effective and efficient service delivery to the consumers. Individual workers' needs (self-concept and expectations for outcomes and/or consequences) are some of the more important individual-level determinants of work motivation. Motivated employees end up delivering quality services to the clients. These determinants, coupled with the individual worker's technical and

intellectual capacity and resource availability, lead to worker performance (ibid). Also affecting the level of motivation is a worker's actual experience of outcomes or consequences: observed effects of worker performance, direct feedback from supervisors or community, or rewards or punishments for work behavior (Bennett and Lynne 1999).

### **2:3 Overview of literature and summary of research gaps**

Much of the literature cited above illustrates the issues to be addressed in this study. However, none of the studies described above pertain to a nomadic and pastoral set up.

The critical review above reveals that not much has been done to address the challenges of the liberalized water and sanitation provision in Kenya and especially among the nomadic and pastoral communities of Kenya. Since independence, these communities depended on outside expertise to manage the few and inadequate water and sanitation services. These communities are now running their own water and sanitation companies. They are therefore confronted with management issues, educational and training needs, and technical know to provide safe water and sanitation services. The Garissa Water and Sanitation Company provide an opportunity to understand better some of these issues.

### **2:4 The conceptual frame work**

According to (Mugenda and Mugenda, 2003) a conceptual framework helps to show graphically or diagrammatically the proposed relationships among the various variables in the study (Mugenda and Mugenda, 2003). The conceptual framework of this study is based on five Independent variables namely; unaccounted for water, employees' training, management styles, water pollution and water infrastructure. Below figure shows how the independent variables affect service delivery which is the dependent variable of the study.

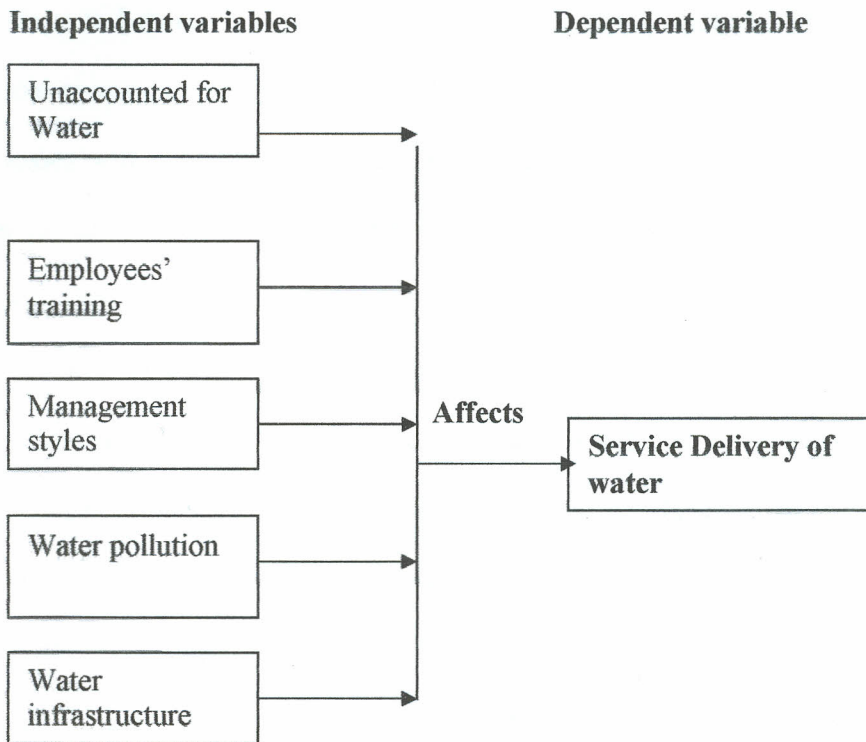


Figure 2.1 Conceptual Framework

Source (Author, 2010)

## 2.5 Operationalization of the Variables

### Employees' Training

Training is an activity leading to skilled behaviour. Staff training consists of both formal training events and on-the-job training. The main indicators of training includes; availability of workshops, training sessions, peer reviews and joint planning and implementation, soap-box speeches and Board member visits. These can be diagnosed using tools such as deep-structure interviews and questionnaires. To be successful, the interventions must be directly related to the groups' day-to-day tasks.

### **Unaccounted for water**

The difference between the water pumped into the supply system and the water that is either sold to customers or used free is what constitute water loss. The main indicators for water losses will include; differences in the meters reading, number of litres supplies, number of litres used and overall differences in company recorded units at the supply points and sold ones.

### **Management Styles**

Management is a process by which an executive influences the work and behavior of subordinates in choosing and attaining specific objectives. Management involves planning, organizing, directing, staffing and controls. The main indicators of management styles includes; the assessment on the type of management style adopted by the management which may include; Democratic, dictatorial, minimum interference from the management and open door policy or freedom of access.

### **Water Pollution**

Pollution is Undesirable state of the natural environment being contaminated with harmful substances as a consequence of human activities. The main indicators include; waste disposal, human activities, concern with the environment and presence of water impurities.

### **Water Infrastructure**

This is a stock of basic facilities and capital equipment needed for the functioning of water systems. Inefficiencies in water distribution system due to poor state of water infrastructure results in massive loss of revenue. The indicators include: availability of equipment

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter presents an overview of the methods to be used in the study. Areas to cover include the study design, population, sample and sampling techniques, data collection and analysis.

#### **3.2 Study Design**

This study adapted a descriptive research design. This design was adopted because it describes the state of affairs as it exists at present (Kothari, 2003). The researcher applied this design to investigate the factors affecting water and sewerage management in Kenya case of Garissa water and Sewerage Company. This design allowed the researcher to collect large amounts of data from the target population. The research had engaged in a field survey whose respondents discussed factors affecting water and sewerage management companies in Kenya case study Garissa water and Sewerage Company.

#### **3.3 Target Population**

The target population for this study was all the 160 employees of Garissa water and Sewerage Company. The study targeted all the three cadres in Company namely top management, middle level cadre and lower cadre. These formed the basis for this study report.

**Table 3.1 Sampling Frame**

<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>
Top management	13	8
Middle level cadre	60	38
Lower cadre	87	54
<b>TOTAL</b>	<b>160</b>	<b>100</b>

(Garissa water and sewerage company, 2010)

### **3.4 Sample Design**

The sample frame of this study was the list of employees of GAWASCO as provided by the Human resource manager. Stratification and random sampling technique was used in this study. Stratification was used to group the target population into categories or strata based on the various cadres in the company. The population was consisted of three categories namely top management, middle level cadre and lower cadre. From each category, representative respondents were sampled through simple random methods. This method ensures that all the individuals in the target population have an equal chance of being interviewed and it helps to eliminate the bias. From the above population of 160 a proportional sample of 47 was determined using 30% of the population. Kothari (2003). argued higher percentage increases the reliability of the results and therefore generalization of the findings with certainty.

**Table 3.2: The Sample Size**

<b>Categories</b>	<b>Frequency (N)</b>	<b>Multiplies factor (30%)</b>	<b>Sample Size (n)</b>	<b>Percent</b>
Top management	13	0.3	4	8.1
Middle level cadre	60	0.3	18	37.5
Lower cadre	87	0.3	26	54.4
<b>TOTAL</b>	<b>160</b>		<b>47</b>	<b>100</b>

**Source: (field data, 2010)**

### **3.5 Data collection Instruments and procedure**

Primary data was used in this study through administration of questionnaires. A questionnaire was designed to capture the various variables of the study. The questionnaire had both open-ended and closed questions covering issues on the factors affecting water and sewerage management in Kenya. Open-ended questions permitted free responses from the respondents, without providing or suggesting any structure for the replies (Mutai, 2000).

Pre-tested administration of the data collection instrument with a small set of respondents from the population for the full scale survey was done. The purpose of pre-testing was to identify problems with the data collection instrument and find possible solutions to the research questionnaires. The total period for data collection was approximately ten to fourteen days depending on the researcher ability to speed up the work.

### **3.6 Data Analysis**

The questioners were dropped and pick by the researcher. Data from the field was tabulated, coded and entered in the computer. Data was analyzed using statistical package for social sciences (SPSS).The data from the study was analyzed using both qualitative and quantitative techniques. The research findings were presented using frequency tables, percentages, pie charts and bar graphs among others.

## **CHAPTER FOUR**

### **RESEARCH FINDINGS**

#### **4.1 Introduction**

This chapter presents the findings of the study based on data collected from the field. The analysis was focused on establishing the factors affecting water and sewerage management in Kenya using Garissa Water and Sewerage Company. The researcher made use of frequency tables and percentages to present data.

#### **4.2 Demographic Details of the Respondents**

Table 4.1 below shows the demographic details of the respondents (employees) interviewed in this study. The table shows that 68% (n=47) of the respondents are male while 32% are female. Most employees of Garissa Water and Sewerage Company (41%) are young people between ages 20 and 29 years. However 30 to 39 years and 40 to 50 years accounted for 19% and 34% respectively. Only 6% of the respondents were above 50 years old. Seventy-percent (70%) of the employees have worked with the company for more than one but less than five years. Only 26% and 2% of the respondents accounted for less than a year above 5 years. Almost half of the employees (47%) of Garissa Water and Sewerage Company have tertiary college level of education. However those respondents with secondary, undergraduate and postgraduate levels of education accounted for 19%, 23% and 7% respectively as shown in table 4.1

**Table 4.1: Demographic Details of the Respondents**

Demographic Detail	Category	Frequency (n=47)	Percent (%)
Gender	Male	32	68.0
	Female	15	32.0
Age	20-29yrs	19	41.0
	30-39yrs	9	19.0
	40-50yrs	16	34.0
	Above 50yrs	3	6.0
Duration of Working	Less than 1yr	12	26.0
	1-4years	33	70.0
	5-10years	1	2.0
	Above 10years	1	2.0
Educational Level	Primary	2	4.0
	Secondary	9	19.0
	Tertiary College	22	47.0
	Undergraduate	11	23.0
	Postgraduate	3	7.0

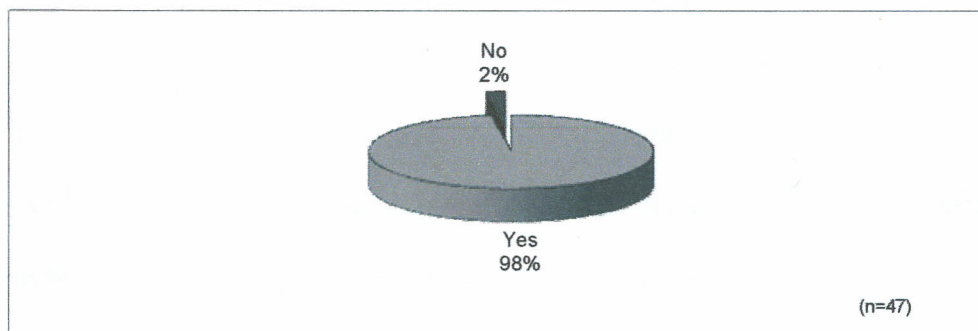
Source: (Field data, 2010)

### 4.3 Factor affecting Water and Sewerage Companies Efficiency

#### 4:3:1 Unaccounted for water

The respondents were asked if they ever experience water losses in their system and almost all (98%, n=47) the respondents answered in the affirmative only 2% said they don't. See figure 4.1 below.

**Figure 4.1: Experience Unaccounted for Water in the System**

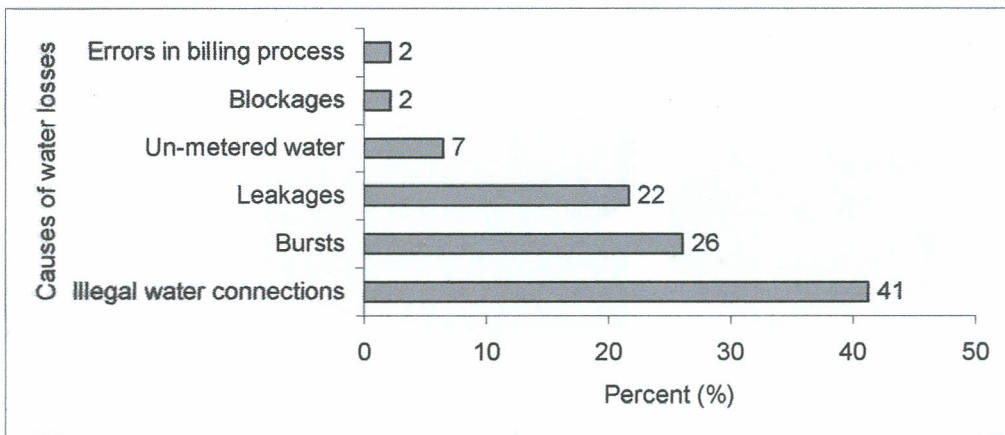


Source: (Field data 2010)

Asked on the main causes of Unaccounted for water in the company, 41% (n=47) of the respondents linked this problem to illegal water connections, while 26% said it was caused by bursts while 22% connected it to leakages. The remaining 11% attributed the problem to mistakes in billing system, blockages or absence of water meters.

This is shown in figure 4.2.

**Figure 4.2 Major Causes of Unaccounted for water in the Company**



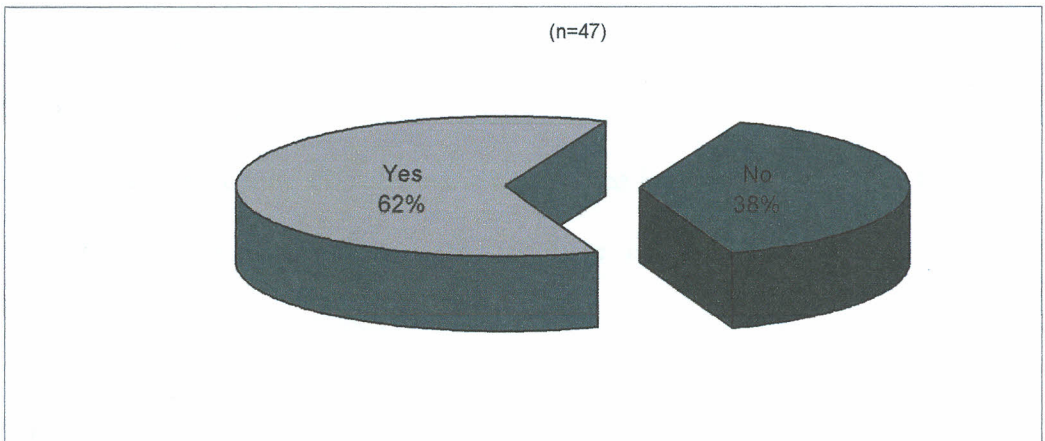
Source: (Field data 2010)

To control the unaccounted for water after treatment in the company, the respondents said promptly repair of pipe bursts and leakages was crucial. The respondents' stresses need for introduction of zone meters, regularly patrol for illegal connections, control valves and computerization of the billing system. The other point that respondents unanimously agreed upon was proper training of the workers and introduction of master meters. Other causes of water losses identified by the respondents included old and outdated water infrastructures, wasteful water practices, back washing and gardening water.

### 4.3.2: Staff Training

When asked if they have ever received any work-related training, 62% of the respondents said they had while 38% had not. The respondents said that because of such training they are now able to offer their duties more effectively and efficiently and their work performance and career grade had improved. Despite these further follow up reveal some interesting findings as shown below in table 4.2 below.

**Figure 4:3 work-related Training**



Source: (Field data 2010)

The respondents were asked to rate the level of training of employees in Garissa Water and Sewerage Company relative to the jobs they do in the company. The results in table 4.2 show that 45% of the respondents had very little training for their current jobs and 43% were partially trained for the jobs. Only 11% said that they were very well trained for the jobs they were doing. This indicates that although the staff received trainings, there is a mismatch between the trainings and an employee's job.

**Table 4.2: Rating of the Level of Training in Relation to the Jobs**

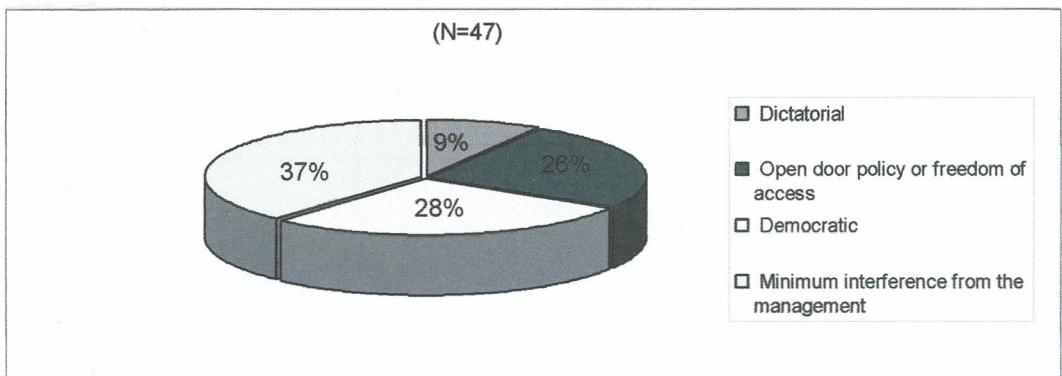
Rating	Frequency	Percent (%)
Very well trained for the job	5	11
Partially trained for the job	20	43
Have very little training for the job	21	45
Not trained at all	1	1
<b>Total</b>	<b>47</b>	<b>100.0</b>

Source: (Field data 2010)

**4:3:3 Management Styles**

Garissa Water and Sewerage Company have varied management styles adopted by the managers. When asked the management style adopted by the management in the company, 37% (n=47) of the respondents said that there is minimum interference from the management while 28% described the management style as democratic. Twenty-six percent of the respondents said the management uses open door policy or freedom of access as shown in figure 4.4 below.

**Figure 4:4 Management styles adopted in the company**



Source: (Field data 2010)

Asked whether the management styles employed at Garissa Water and Sewerage Company was efficient, 57% (n=47) responded in the affirmative while 26% thought the style was ineffective.

**Table 4:3 Efficiency of management styles in GAWASCO**

<b>Rating of Management style</b>	<b>Frequency</b>	<b>Percent (%)</b>
Very efficient	6	13
Efficient	27	57
Inefficient	12	26
Very inefficient	2	4
Total	47	100.0

Source: (Field data, 2010)

The respondents were further asked if the management styles employed by the management posed a challenge to the running of the Company, 62% said it did not, only 38% said it did. This was because the workers were least motivated, and that the management style affected rather than enhance performance in some sections. However, in extreme cases it could be concluded that the employees were least involved in decision making. See table 4.4 below.

**Table 4:4: Whether the existing management style pose a challenge**

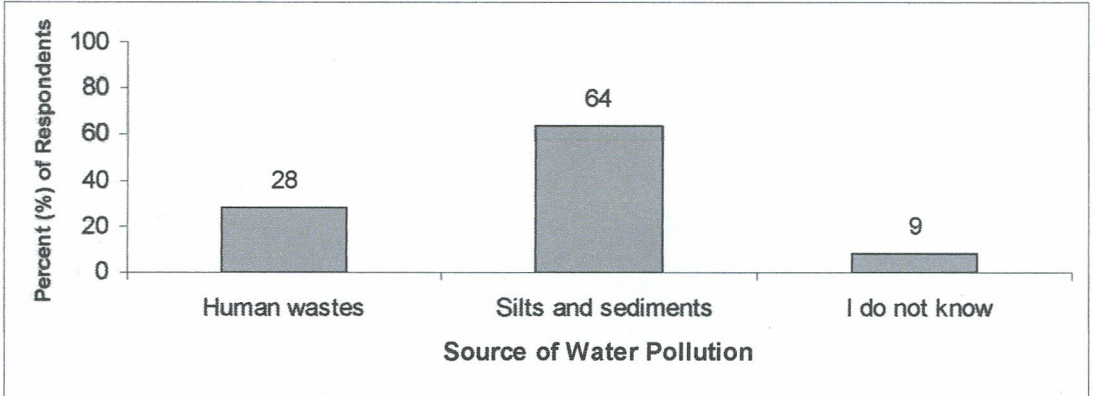
<b>Response</b>	<b>Frequency</b>	<b>Percent (%)</b>
Yes	18	38
No	29	62
Total	47	100

Source: (Field data 2010)

#### **4.3.4: Water Pollution**

The study established that the main source of water pollution in Garissa Water and Sewerage Company was silts and sediments (64%) and human wastes (28%). See figure 4.5 below.

**Figure 4:5 Main Source of Water Pollution**



Source: (Field data 2010)

The respondents were asked to rate the level of pollution of water supplied into Garissa. 66% of them said there is little pollution while 19% said it is not polluted at all. However highly polluted responses accounted for 4% while 11% of the respondent were not able to rate as shown in table 4.5 below.

**Table 4:5: Rating of the level of pollution of water supplied by the company**

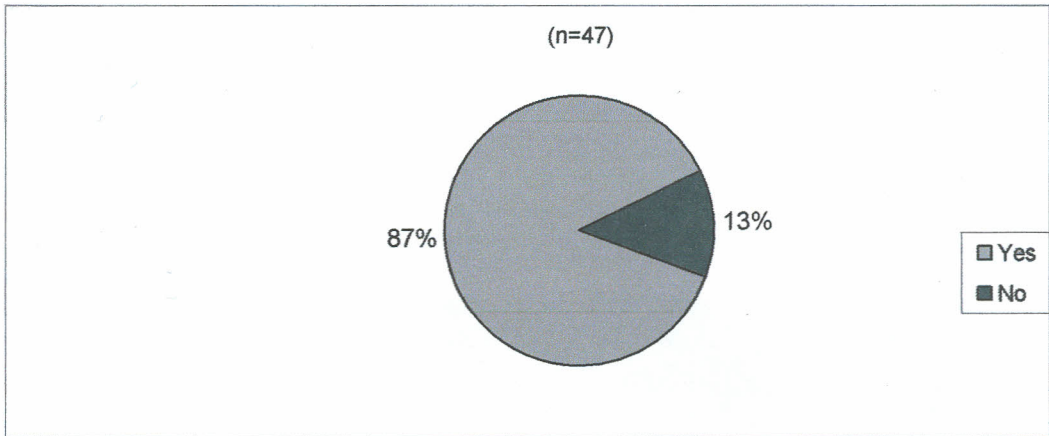
Rating of pollution level	Frequency	Percent (%)
Little pollution	31	66
Not polluted at all	9	19
Not able to rate	5	11
Highly polluted	2	4
Total	47	100.0

Source: (Field data 2010)

#### **4.3.5: Water Infrastructure**

When asked if Garissa Water and Sewerage Company has modern and adequate equipment for supplying water to all the consumers, 87% (n=47) of the respondents said yes because of the newly commissioned water treatment facility which is ultra modern and has capacity to supply water to all consumers but 13% thought it did not. See figure 4.6 below.

**Figure 4:6: Modern and Adequate Equipment for Water Supply in GAWASCO**



Source: (Field data 2010)

On the rating on the adequacy of water handling equipment, majority of the respondents (70.2%) rated them as adequate. Very adequate and inadequate responses accounted for 17% and 12.8 respectively as shown in table 4.6. This shows that company has the needed facilities to offer efficient services to the residents. This means that water handling equipment is not a challenge to the company.

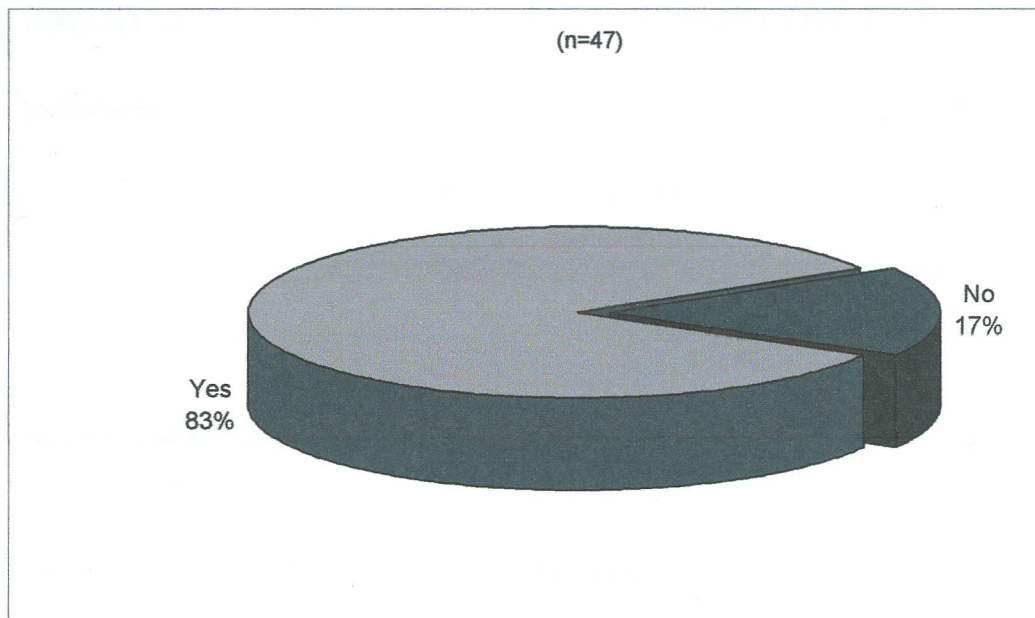
**Table 4:6: Rating of the level of adequacy of water handling equipment**

Ratings	Frequency	Percent
Very adequate	8	17.0
Inadequate	6	12.8
Adequate	33	70.2
Total	47	100.0

Source: (Field data 2010)

The respondents were asked if the water supply infrastructure at Garissa Water and Sewerage Company needs improvement and 83% answered in the affirmative while only 17% thought otherwise. See figure 4.7 below.

**Figure 4:7: Need for Improvement on Water Supply Infrastructure**



Source: (Field data 2010)

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents an overview of the Summary of the Findings, conclusions and recommendations of the study. The chapter also presents suggestions for related studies that could be carried out in the future.

#### **5.2 Summary of Findings**

The study revealed that the staff of the water company had a problem with water losses with 98% of the respondents experiencing water losses in their system. These losses were attributed to illegal water connections (41%), bursts (26%) and 22% to leakages. The remaining 11% was attributed to mistakes in billing system, blockages or absence of water meters.

The findings of the study showed that 62% of staff had training and 38% had not. This shows the company was taking training seriously. However, there was a mismatch between the trainings and an employee's job.

The study also indicated that Garissa water and Sewerage Company have varied management styles adopted by the managers. The management styles identified by the respondents show that 37% feel minimum interference from management, 28% feel the management is democratic, 26% open door system and 9% dictatorial.

The study also established that the main source of water pollution in Garissa Water and Sewerage Company is silts and sediments (64%) and human wastes (28%). The study further indicated 65% water supplied into Garissa has some pollution and 19% has not pollution at all. However, only 4% of the respondents said that the water is highly polluted while 11% were not able to rate pollution levels of Garissa water.

### **5.3 Conclusion**

Based on the findings of the study, the following were identified as the major setbacks affecting effective operations of water and sewerage companies in Kenya. Unaccounted for water through illegal water connections, bursts, leakages are a problem for the company. This is occurring yet the study shows that the company has new and modern water infrastructure to supply water to its consumers. This might be due to the mismatch between the staff trainings and their current jobs. Siltation, sedimentation and human wastes were identified as the major sources of water pollution in Garissa. Garissa Water and Sewerage Company has a mixture of democratic management style and somehow a laid back management style which was perceived favorable by the employees but unfortunately not motivating.

### **5.4 Recommendations**

To reduce Unaccounted for water at Garissa Water and Sewerage Company the study recommends implementation of a surveillance system and regular patrols which will help the management to identify the illegal water connections, bursts and leakages. The surveillance system will also be instrumental in alerting the management on bursts and

leakages to ensure prompt repairs are done. This will help to conserve water which is a scarce resource.

Furthermore the study recommends that proper disposal of human waste should be encouraged. This should go along with awareness creation to the local communities on the importance of maintaining proper hygiene through proper disposal of human wastes. However proper treatment of water is crucial to ensure residents get clean water.

There is need by the management to strategize on the various ways and means to boost the staff morale. This could be done through performance appraisal, rewards, review of their remuneration, and authority delegations among others. This will help to enhance the overall employee performance in the company.

There is however need for proper trained personnel on equipment handling and operations for optimal usage. This calls for urgent attention on the issue of staff training and their jobs. Part of the problems of water losses despite the availability of good water infrastructure seems to be the mismatch between the trainings and staff jobs. There is need to carry out job needs analysis at the company.

### **5.5 Suggestions for Further Research**

A key issue that has emerged in this study is that the water company (and perhaps is the case for other water companies and water boards) is that they received good equipments and infrastructure. The observed serious water losses in the presence of such resources and as shown in this study allude to lack of adequate human resources. Part of this is the mismatch between the trainings and jobs held by staff. This therefore makes it important to

study human capacity at these companies that have immense donor resources. A study of the capacity of the human resources and their roles and contributions is seriously wanting.

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## APPENDIX 1: QUESTIONNAIRES

Serial No.....

The questionnaire is meant to collect information on the factors affecting water and sewerage management in Kenya, Case study of Garissa Water and Sewerage Company. Kindly answer the questions by writing a brief statement or ticking in the boxes provided as will be applicable. The information provided will be treated as strictly confidential and at no instance will your name be mentioned in this research.

### SECTION ONE: DEMOGRAPHIC INFORMATION

**1. Indicate your age category**

- 1) Below 20years
- 2) 22-29 years
- 3) 30-39 years
- 4) 40-50 years
- 5) Above 50 years

**2. What is your gender?**

- 1) Male
- 2) Female

**3. How long have you worked in this company?**

- 1) Less than one year
- 2) Between 1-4 years
- 3) Between 5-10 years
- 4) Over 10 years

4. What is the highest level of education?

- 1) Primary
- 2) Secondary
- 3) Tertiary College
- 4) Undergraduate
- 5) postgraduate
- 6) Other (specify) .....

**Section Two: Factors Affecting Water and Sewerage Management**

**A) Unaccounted for Water**

5. Do you experience water losses in your system?

- 1) Yes
- 2) No

6. If yes, what is the main causes of water losses in this company?(tick one)

- 1) Illegal water connections
- 2) Leakages
- 3) Bursts
- 4) Blockages
- 5) Un-metrered water
- 6) Errors in billing process
- 7) Others (specify).....

7. How do you control of water loss after treatment in this company?

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8. What percentage of total water loss would you attribute to the following causes;(tick appropriately) {1=less than 25%, 2= Between 25-50%, 3=51-75%, 4=Above 75%}

Factors	1	2	3	4	5
Illigal Water Connections					
Leakages					
Bursts					
Blockages					
Un-metrered water					
Errors in billing process					

9. Apart from the factors in the table above, what are the other causes of water losses in this company?

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**B) Staff Training**

10. Have you ever received any trained related to the work your do in this company?

- 1) Yes
- 2) No

11. If yes, does this training helped you when discharging your duties in this company?

- 1) Yes
- 2) No

12. If yes above, specify how.

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**13. How would you rate the level of training of employees relative to the jobs they do in this company?**

- 1) Very well Trained
- 2) Partially Trained
- 3) Have very little training
- 4) Not trained at all

**C) Management Styles**

**14. What kind of management styles does the management adopt in this company?**

- 1) Dictatorial
- 2) Democratic (Employee driven/ Participative)
- 3) Minimum interference from the management
- 4) Open door policy/Freedom of Access
- 5) Any other(s) specify .....

**15. How would you rate the efficiency of management styles employed by the management in this firm?**

- 1) Very efficient
- 2) Efficient
- 3) inefficient
- 4) very inefficient
- 5) Am not able to rate

16. Do you think the management styles employed by the management pose a challenge to the running of this organization?

- 1) Yes
- 2) No

17. If yes in the question above, in what ways? Explain.

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**D) Water Pollution**

18. What is the main source of water pollution in this company? (Tick only one option).

- 1) Human wastes
- 2) Industrial chemicals/wastes
- 3) Silts and Sediments
- 4) Fertilizers and other Agricultural wastes
- 5) I do Not Know
- 6) Others(specify).....

19. How would you rate the level of pollution of water supplied into this company?

- 1) Highly polluted
- 2) little pollution
- 3) Not polluted at all
- 4) Not able to rate

20. What do you think should be done to reduce water pollution in this company?

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**E) Water Infrastructure**

**21.** Does this company have modern and adequate equipment for supplying water to all the consumers?

1) Yes

2) No

**22.** Explain your answer.

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**23.** How would you rate the level of adequacy of water handling equipment in this water company?

1) very adequate

2) Adequate

3) Inadequate

4) Very inadequate

**24.** How would you describe the nature of the water infrastructure in this company?

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**25.** Do you think the water supply infrastructures need to be improved?

1) Yes

2) No

**26.** Apart from the challenges in the questions above, what other challenges face water and sewerage companies in Kenya?

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27. What recommendations would you make as pertains to addressing the challenges facing this company?

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**THANKS FOR YOUR RESPONSES**

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