



Role of Electronic Water Monitoring System on Customer Satisfaction in Public Service Institutions (A Case of Mombasa Water Supply and Sanitation Company)

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ABSTRACT

Customer satisfaction refers to the state of mind or the perception that customers have about an organization and its products or services at the time their perceptions have been met or surpassed. Customer service is an integral part of any organization. Over the past few years, customer satisfaction and technology have become conjoined. Customers today are demanding more and more techno-savvy service that will provide quick and efficient service that will keep pace with the ever changing technological world. The water reticulation system in Mombasa is old and dilapidated and is prone to leaks and bursts. Coupled with this fact is the challenge of illegal connections done by unscrupulous persons who connect to the system unprofessionally leading to leaks. Leaks and bursts may go for days an end without being reported leading to excessive loss of water. However, residents are lax in reporting leaks in their areas and have tended to ignore the issue either out of ignorance or lethargy to report the issue. There appears to be lack of effective communication between the utility and the customers which needs to be addressed. Water services by the Mombasa Water Supply and Sanitation Company (MOWASSCO) thus continue to be unsatisfactory given the key challenge of financial sustainability. Poor services invariably affects the degree of customer satisfaction. The purpose of this study was to establish the role of electronic water monitoring systems in increasing customer satisfaction with services provided by the Mombasa Water Supply and Sanitation Company, despite the several challenges in water service provision as outlined. This research used descriptive survey where the target population totaling 600 was drawn from the five water meter reading zones in Mombasa County namely Island North, Island South, Likoni, Nyali and West Mainland. The study used primary data which was gathered using structured questionnaires. Chapter one dealt with a background of the study including a background of the water supply system and its challenges. A synopsis of customer satisfaction in public institution was given together with a brief of the water supply in Mombasa. A statement of the problem described in depth the current challenges encountered by MOWASSCO in its service delivery. The chapter also gave an insight into the use of technology in enhancing customer satisfaction. Chapter two analyzed the literature review with emphasis on adoption of technology in the service industry and also outlined the conceptual framework. Chapter three outlined the research methodology, while Chapter four analyzed the data and derived conclusions. Data collected was analyzed using descriptive statistics and regression, presented in tables and pie charts extracted from both MS Excel and Statistical Package for Social Sciences (SPSS) software tools version 20. Lastly, Chapter five gave a summary of the study, conclusions, recommendations and further research.

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Introduction

The public sector forms an important segment of an economy. Any development in public sector performance would have a direct effect on the economic growth of a country. However, this implies that a lot of focus needs to be directed towards efficiency that will allow the public sector to have any tangible effect on development. Public institutions must work in the right manner and at least cost (Bengtsson, 2011). Amidst the growing demand for better services by the

customers, public institutions must embrace new models of service delivery.

According to Kibblewhite (2011) there was need for public institutions to not only do things right and in the right way and cost, but more so, the institutions had to be open to new models of service delivery. This underlines the need for public institutions to embrace technology in order to enhance efficiency and effectiveness in service delivery and enhance customer satisfaction. The study sought to find out the role of electronic water monitoring systems when embraced in key

service delivery areas, in improving the levels of customer satisfaction, in the area of operation of Mombasa Water Supply & Sanitation Company.

Global customer satisfaction

Customer satisfaction is a marketing term which measures how products and services supplied by a company meet or surpass customer expectation. It can also be looked at as the number of customers, or percentage of total customers, whose reported experience with a firm, its products, or its services (in other words "the ratings") exceeds specified satisfaction goals. Customer satisfaction is seen as a key performance indicator within business and is a key item of the Balanced Scorecard (Alsyof, 2006). In a competitive marketplace where businesses compete for customers, customer satisfaction is seen as a key differentiator and increasingly has become a key element of business strategy.

Unlike in the public sector, the private sector upholds customer satisfaction and loyalty – which is secured through high-quality products and services which meet customer needs and which provide value for money. This is seen as essential for survival of business. In the public sector the concepts of service quality, customer satisfaction and customer loyalty have not been a priority mainly because public services have a built-in customer base (Akinboade, Kinfack, & Mokwena, 2012). According to Van de Wall (2016) public services tend not to go out of business and the abolishment or closing down of a public organization is fairly rare. Van de Wall (2016) goes on to add that many public services are even successful when their customer base shrinks, either because the problem they have are created for is solved, or because they have been successful in discouraging clients of whom many are involuntary clients.

In the recent past, technology has been setting pace in customer service on a global scale. In the last few decades, IT applications have changed the landscape of the service industry (Kaushik & Rahman, 2015). One of the key contributors to future marketing success, for both large and small firms alike, will be the exploitation of electronic gadgets, which will facilitate the use and management of information. Through the use of such gadgets, institutions are presently re-engineering the way in which business and marketing of their goods and services is being conducted. The approaches to marketing have progressed from product-centered to customer-centered approaches. Marketers are now more than ever before, focusing on customer experience with products and services.

According to Kaushik and Rahman (2015) the impact has been mainly profound in the services arena through the development of self-service technologies (SSTs). Past studies on the adoption of technology in different services such as the hospitality sector confirm that a growing number of consumers prefer DIY (Do-It-Yourself) opportunities and in some cases are eager to use SSTs (Jaakkola, Helkkula & Aarikka-Stenroos, 2015). According to Hipps (2016) technology is making it easier than ever to improve diversity levels and reduce discrimination, by providing greater transparency and insight for the service industry. Recently, the mobile service sector has experienced disruptive change caused by smartphones and mobile application (app) services in a short period of time. The numbers of app services have increased explosively with the rise of mobile open markets (Park, 2016). The importance of customer experience is emphasized by Lipkin (2016) who attests that the interest in customer experience (CX) has increased exponentially over

the past decades amongst service researchers and practitioners.

Customer Satisfaction in Public Services in Kenya

According to the Collins English Dictionary, a public service is something such as health care, transport, or the removal of waste which is organized by the government or an official body in order to benefit all the people in a particular society or community. It is something that is done to help people rather than to make a profit. Looked at from another angle, it may be defined as a service rendered in the public interest (Baruch & Holtom, 2011). Public services in Kenya include provision of water and waste water services, roads, infrastructural development, library services, health services, human capacity, conservation and administration.

Over the past half-decade, Kenya has emerged, seemingly from nowhere, as a hotbed of innovation in the area of mobile money-transfer systems and for other types of software and services for mobile devices. According to Mengistu and Imende (2013) nearly 70 percent of Kenyan adults transfer money to each other via their mobile phones, the highest percentage of any country on earth, and more than US\$320 million dollars are transferred via Kenyan mobile phones each month. Kenya has become host to a flourishing ecosystem where numerous software applications, services and even social habits have emerged from the country's aptitude, and appetite, for mobile transaction platforms (Mengistu & Imende, 2013). Technological transformation in the business arena is aimed at the customer and ensuring that the customer gets a unique customer experience. Lecic-Cvetkovic, Omerbegovic-Bijelovic, Zaric and Janicic (2016) attest to the fact that internet technologies have completely paved the way to the concept of an electronic economy and that they have enabled the creation of innovative business approaches in the field of sales, production, service delivery and purchases.

The public service sector, which has long been labelled as "customer averse" must thus tow the line in this era of technological transformation. According to a report on Kenya's ICT integration into public services (2016), currently service areas on the government side, which have embraced ICT, include the iTax portal, Huduma Centres (under the Ministry of Development and Planning), the Integrated Financial Management Information System and the eCitizen portal. The report further states that "the rising number of smartphone users will support growth in mobile money usage and cashless payments, especially as the industry looks to provide new value-added services such as consumer payments, cash disbursements and collections in value chains such as agriculture, healthcare, education, power, water and other fast moving consumer good value chains" (Kenya ICT, 2016).

The Government of Kenya has outlined a series of programs that are meant to transform key sectors of the economy. Water is defined as an essential resource to support the development activities planned under the Vision 2030. In order to achieve the Vision 2030, the proper implementation system and planning of water resources management are essential to cope with the increasing water demands of domestic, irrigation, industries, etc. while conserving the catchments sustainably. The Public Sector Reforms Program is aimed at restoring the sector to a well-equipped one that can achieve the national development goals. Performance of the public sector has been pegged to stringent performance contracts that are signed between line

Ministries and their relevant departments and institutions (Performance Contracting Guidelines, 12th Edition).

Customer satisfaction is a key component of the performance contracts and thus the public institutions must aim for excellence in service delivery. Organizations operating in the public sector have also come to realize that they must ensure their services are soundly based on the needs and expectations of their stakeholders including communities, citizens and customers, and that they are seen as providing service quality. According to Mutula and Bwalya (2016) many countries are now positioning e-government as a lever for the revitalization of public administration towards improved efficiencies, effectiveness and reduced cost in delivering public services.

Notwithstanding that the component of Information Technology has been incorporated into the annual performance contracts, most public service utilities in Kenya are still lagging behind in the adoption of IT in their service delivery. The United Nations Conference on Trade and Development report (2016) concludes that "Kenya today lacks well-developed capacities to provide advice and information to technology users, has inadequate capacity to screen foreign technologies and is unable to formulate adequate technology-related policies or plans. There will be need for significantly increased skills at the enterprise level and in government institutions to address these shortcomings".

Water supply in Mombasa County

The Coast Water Services Board (CWSB) was established through a Gazette notice No. 1328 of 27th February 2004 as per the Water Act 2002 as part of the water reforms. The mandate of the Board is to ensure efficient and economical provision of water and sanitation services within its area of jurisdiction which covers six counties namely Mombasa, Kwale, Kilifi, Taita-Taveta, Tana River and Lamu. However the Board does not supply water and sanitation services directly to the consumers but does so through its contracted agents called Water Service Providers. In line with the water Act, 2002, the Board contracted seven Water Service Providers (WSPs) to oversee the distribution of water and sewerage services in its area of jurisdiction. The contracted WSPs are: Mombasa Water Supply and Sanitation Company (MOWASSCO), Malindi Water and Sewerage Company (MAWASSCO), Kilifi-Mariakani Water and Sewerage Company (KIMAWASSCO), Taita-Taveta-Voi Water and Sewerage Company (TAVEVO), Lamu Water and Sewerage Company (LAWASSCO), Kwale Water and Sewerage Company (KAWASSCO) and Tana Water and Sewerage Company (TAWASSCO).

MOWASSCO has been mandated by the Coast Water Services Board, through a service provision agreement, to provide cost effective and affordable quality water and sanitation services to the residents of Mombasa County (WASREB Impact report, 2015). The Coast Water Services Board sells bulk water to the utility and in turn the utility sells the commodity to the residents. MOWASSCO is also required to pay lease fees for the use of the water infrastructure which the Coast Water Services Board holds in trust, on behalf of the Government of Kenya. Established in 2011, MOWASSCO is a limited liability company that took over the operations of water and sanitation services provision in Mombasa County as from 1st September, 2005 after the water reforms of 2002 decentralized the water service delivery (WASREB Impact report, 2015).

The company took over the operations of water and sanitation services provision in Mombasa from the then service provider National Water Conservation and Pipeline Corporation (NWPC).

The demand for water in Mombasa County is estimated at 140 Million liters per day against an average supply of about 51 Million liters per day (WASREB Impact report, 2015). Out of the volume supplied only about 50% can be accounted for by the water utility, while the remaining 50% remains unaccounted for (WASREB Impact report, 2015). The level of unaccounted for water represents a loss of revenue of about Kshs 60 million per month. The loss of revenue provides a key pointer of inefficiency in the operations of MOWASSCO which invariably leads to a decline in customer satisfaction. Since its formation in 2004, the Coast Water Services Board has been undertaking a number of projects to improve service delivery to the residents of Mombasa County through their agent in Mombasa namely, MOWASSCO. A lot still remains to be done to address challenges, including low water and sanitation coverage; high non-revenue water (NRW) levels; high operational costs leading to low O&M cost coverage; inadequate staff capacity; and poor corporate governance which are all directly related to the satisfaction level of customer. This study sought to find out the role of electronic water monitoring systems in addressing some of the challenges and in so doing, improving the level of customer satisfaction.

Use of technology in improving customer satisfaction

According to Jan and Abdullah (2014) in today's information rich era where customers are the nexus of every business, many companies are forced to adopt the required technologies in order to satisfy the customers. In recent years, both the political leadership and managers in the public sector have been emphasizing the importance of innovation to fulfill public sector missions (Palm, Lilja, & Wiklund, 2015). Customers frequently use information technology such as websites or automated telephone systems as the initial point of contact with a firm (Makarem, Mudambi, & Podoshen, 2009). According to Nissen, Schepers and Belance (2016), many service providers use technological service innovations in their operations and business models, especially self-service technologies (SSTs). Ganguli and Roy (2011) suggested that customers became loyal if the technology provided was easy to use and was reliable and convenient. Globally, marketers are putting a lot of efforts in technology, and the impact has been mainly profound in the services arena through the development of self-service technologies (Kaushik & Rahman, 2015). Overall, technology might create customer convenience and it might reduce firm costs, but it can also increase (or decrease) customer dissatisfaction (Makarem et al., 2009). The sources of satisfaction in technology-enabled service encounters are expected to be convenience, the technology process (incorporating process convenience and reliability of technology), the touch process (incorporating reliability, responsiveness, spontaneity, and service recovery), and the service outcome (Makarem et al., 2009). Parasuraman, Zeithaml and Berry (1996) were of the opinion that the management of technology-based interactions between the customer and the firm was essential to business success. Makarem et al., (2009) concluded that customer satisfaction with technology-enabled service encounters is important, as is satisfaction with technology process.

The Public Sector is crucial for attaining Kenya's development agenda. The agenda has been placed solely in the hands of public service institutions which have been assigned targets to ensure that the public institutions remain on course with the development blueprint (Bedeian, 2013).

The key concern for the Government is that the common citizens must have their basic needs met. According to UNDP report (2015) Kenya's civil service has undergone a number of changes with the aim of improving public services. This included the employee rationalization program, which led to a reduction in wage bills, performance improvement and structural adjustment program after aid cuts, and the institutionalization of results-based management. However, all these reforms did not have much impact on the quality of service delivery. Later, between 2006 and 2008, the Government decided to shift the public service towards a results-orientation approach by introducing and facilitating the development and management of a holistic Results-Based Management system through the 'Results for Kenya' program (Otwori, 2013). The aim was to enhance performance efficiency in all government ministries, departments and agencies. It also meant to reverse the negative image of the public service (UNDP report, 2015). In the year 2009, United Nations Development Program (UNDP) supported the Kenyan government to step up public sector reforms to focus on national transformation. These efforts were boosted after the promulgation of the new Constitution of Kenya in 2010. The changes were an ideal opportunity to tackle deep-rooted problems of inefficiency because citizens were increasingly becoming empowered to demand for better services.

However, despite efforts by the Government of Kenya to ensure public services meet with set service standards, public services are still found to be wanting. According to Muhairiwa (2009) rampant mismanagement and laxity on the part of the civil servants have compromised on the quality of services offered by public service institutions. In the water sector, water officers are known to collude with customers for illegal connections in return for a small fee (Customer complaints report, 2015). Meter readers have been known to ignore disconnections for unpaid bills in return for favours. This has contributed to the high rate of non-revenue water. As earlier noted, high levels of NRW translate to financial losses thereby contributing to wastage of funds that could otherwise have been used to improve service delivery.

The Coast Water Services Board inherited old and dilapidated water infrastructure from the previous water institution the National Water Conservation and Pipeline Corporation. The infrastructure is prone to leaks and bursts which contributes heavily to non-revenue water. Like in other parts of the globe, climate changes continues to affect the already water scarce coast region (WASREB Impact report, 2015). Water supply has also been affected by a fast growing population that has seen demand supersede supply. The steady growth of social and economic development in the County of Mombasa has also put a lot of pressure on the water supply. Apart from these challenges, the water services have been affected by political wrangles brought about by a devolved Government, which have emerged between the County Government and the Board, over ownership of the services (Devolution in Kenya, 2013). Against this backdrop, it is increasingly becoming challenging for the water utility in Mombasa to satisfy customers.

According to the WASREB Impact report (2015) non-revenue water creates a huge challenge in most counties. Considering the sector benchmark of 20%, the current non-revenue water level of 42% translates to financial loss of Kshs5.9Billion to the sector (WASREB, 2015). This not only threatens the financial sustainability of the sector but also wastes fund which could have been used to increase access and improve service delivery.

Illegal connections, theft of water and malfunctioning meters have contributed greatly to the rate of non-revenue water. These challenge have drastically affected the volume of water that can be accounted for and continued to deplete supply and creating a lot of dissatisfaction with the water supply services, amongst customers.

Over the last two years MOWASSCO has made some efforts in adopting digital payment of bills through the Mpesa method. Digital payment is progressing albeit at a slow pace, given that a large number of customers can still be seen queueing to pay their bills manually. The utility is however lax in adopting new meter reading technologies. The bulk of the customer complaints are related to meters, where meters are malfunctioning. Majority of customers also feel that their bills are always estimated leading credence to the fact that there are challenges in meter reading. On the other hand meter readers of the utility often face challenges while accessing meter points in individual homes ranging from secured gates to water logged meters which makes reading difficult (DuBrin, 2012).

The water reticulation system in Mombasa is old and dilapidated and is prone to leaks and bursts. Coupled with this fact is the challenge of illegal connections done by unscrupulous persons who connect to the system unprofessionally leading to leaks. Leaks and bursts may go for days an end without being reported leading to excessive loss of water. However, residents are lax in reporting leaks in their areas and have tended to ignore the issue either out of ignorance or lethargy to report the issue. There appears to be lack of effective communication between the utility and the customers which needs to be addressed (Customer complaints report, 2015). Water services by the Mombasa Water Supply and Sanitation Company (MOWASSCO) thus continue to be unsatisfactory given the key challenge of financial sustainability. Poor services invariably affects the degree of customer satisfaction. It is against this backdrop that this research sought to establish whether electronic water monitoring systems could be used to alleviate challenges encountered in water service delivery and thereafter improve services which will directly improve the satisfaction level of customers of MOWASSCO.

Objectives of the study

The specific objectives of the study will be as follows:

- i. To find out the role of electronic leak detectors (ELDs) in improving customer satisfaction in Mombasa Water Supply and Sanitation Company
- ii. To establish the role of electronic meter readers (EMRs) in improving customer satisfaction in Mombasa Water Supply & Sanitation Company.
- iii. To find out the role of electronic water quality testers (EWQTs) in improving customer satisfaction in Mombasa Water Supply & Sanitation Company
- iv. To determine the role of electronic communication devices in improving customer satisfaction in Mombasa Water Supply & Sanitation Company

Related Literature

Theoretical framework

The study was guided by the following theories and models which have sought to explain the drivers controlling customer satisfaction:

The Theory of Assimilation

Festinger's theory of dissonance (1957) forms the basis for the theory of assimilation. The theory of dissonance states that the consumer makes a sort of cognitive comparison between the expectations regarding the product and the product's perceived performance. If there is a discrepancy between expectations and the product's perceived performance, the dissonance will not fail to appear. This point of view on post-usage evaluation was introduced in the literature discussing satisfaction under the form of the theory of assimilation.

According to Anderson, the consumers try to avoid dissonance by adjusting their perceptions of a certain product, in order to bring it closer to their expectations. In a similar way, the consumers can reduce the tension resulted from the discrepancy between expectations and the product's performance, both by distorting the expectations so that they could be in agreement with the product's perceived performance, and by increasing the level of satisfaction through minimizing the relative importance of experimental disconfirmation.

The theory presumes the consumers are motivated enough to adjust both their expectations and their product performance perceptions. If the consumers adjust their expectations or product performance perceptions, dissatisfaction would not be a result of the post-usage process. Consumers can reduce the tension resulting from a discrepancy between expectations and product/service performance either by distorting expectations so that they coincide with perceived product performance or by raising the level of satisfaction by minimizing the relative importance of the disconfirmation experienced (Olson & Dover, 2009). Some researchers have discovered that the control on the actual product performance can lead to a positive relationship between expectations and satisfaction (Anderson, 2013). Consequently, it is assumed that dissatisfaction could never appear unless the evaluation process began with the customers' negative expectations.

Peyton et al., (2013) argues that the Assimilation Theory has a number of shortcomings. First, the approach assumes that there is a relationship between expectations and satisfaction, but it does not specify the way in which the expectation disconfirmation can lead to satisfaction or dissatisfaction. Second, the theory also posits that consumers are motivated enough to adjust either their expectations or their perceptions about the performance of the product. Some researchers have found that controlling actual product performance can lead to a positive relationship between expectation and satisfaction. Therefore, it would appear that dissatisfaction could never occur unless the evaluative processes were to begin with negative consumer expectations.

Roger's Diffusion of Innovation Theory

The diffusion of innovation theory analyses how the social members adopted to new innovative ideas and how they made the decision towards it. Both mass media and interpersonal communication channel is involved in the diffusion process. The theory heavily relies on human capital. According to the theory innovations should be widely adopted in order to attain development and sustainability

(Diggle, 2013). In real life situations the adaptability of the culture played a very relevant role where ever the theory was applied.

Rogers proposed four elements of diffusion of innovations which are: Innovation – an idea, practice, or object perceived as new by an individual. It can also be an impulse to do something new or bring some social change, Communication Channel – The communication channels take the messages from one individual to another. It is through the channel of communication the Innovations spreads across the people.

It can take any form like word of mouth or literary form. Time – It refers to the length of time which takes from the people to get adopted to the innovations in a society. It is the time people take to get used to new ideas. For an example consider mobile phones it took a while to get spread among the people when it is introduced in the market, Social System – Interrelated network group joint together to solve the problems for a common goal. Social system refers to all kinds of components which construct the society like religion, institutions, groups of people etc.

During the late 90's mobile phones were introduced to common people at relatively high prices. Roger's theory of diffusion of innovation can be apprehended by understanding how the people accepted and got used to mobile phones. When mobile phones were first introduced to the market they did not come with a multitude of application. They were marketed as portable land lines.

The Gap Model

The Gap Model of service quality was developed by Parasuraman et al. between 1983 and 1988. This model offers an integrated view of the consumer-company relationship. The model provides an integrated framework for managing service quality and customer-driven service innovation. This model basically provides a roadmap to service providers about minimizing the gap between customers' expectations and the perceived service and to close that gap, if possible. The model highlights the probable obstacles that usually hinder a service provider's ability to satisfy customers.

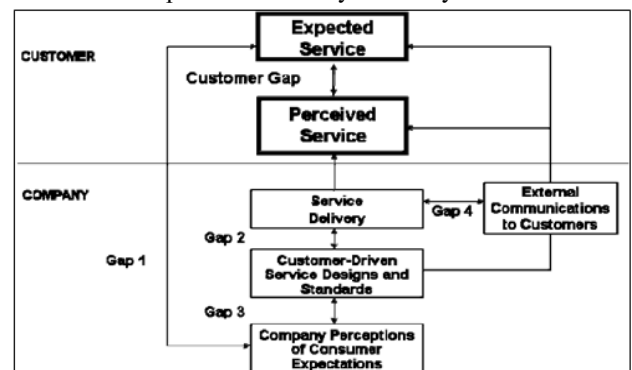


Figure 1.1. Model of Service Quality Gaps Source: Parasuraman et al. (1985).

Figure 1.1 illustrates the GAPS model for improving the quality of service offered. These four gaps collectively give birth to service gap. The service provider's role is to understand the reasons for these four gaps and to eliminate them to improve the quality of service offered and in doing so improve the satisfaction level of customers. Gap 1 is the Knowledge Gap which arises as a result of the difference between customer's expectations and the service provider's perception towards customer's expectations. It simply means that the retailer is not aware (whatever the reason may be), what actually customers expect from him.

Gap 2 is the Standard Gap which arise due to the difference between the service provider's perception of customers' expectations and the customer service standards it sets. Besides understanding what customers expect, service providers should develop some service standards. These standards assist the employees to understand how the top management and customers define and evaluate a quality service. Gap 3 is the Delivery Gap which arises as a result of the difference between the service provider's service standards and the actual service offered to customers despite the existence of guidelines for treating customers correctly and performing services well.

Developing standards and applying them is not enough, standards must be backed by appropriate resources (people, products and technology) and must be evaluated to award and compensate who deserves, on the basis of performance along those standards. Gap 4 is the Communications Gap which arises due to differences between the actual set of services offered to the customers and the service communicated by the retailer to the customers through their promotional program. In short, Communication Gap arises when retailer's promises don't match the performance resulting in adverse effect on the customer gap, and eventually leading to customer dissatisfaction.

The Total Quality Management Model

Total Quality Management is a combined effort of both top level management as well as employees of an organization to formulate effective strategies and policies to deliver high quality products which not only meet but also exceed customer satisfaction. There are many models of total quality management. An example of a TQM system is the Deming Prize which is a global quality award that recognizes both individuals for their contributions to the field of Total Quality Management (TQM) and businesses that have successfully implemented TQM. It is the oldest and most widely recognized quality award in the world. It was established in 1951 to honor W. Edwards Deming who contributed greatly to Japan's proliferation of statistical quality control after World War II. His teachings helped Japan build its foundation by which the level of Japan's product quality has been recognized as the highest in the world.

According to Hansson and Klefsjo (2009) the ability of organizations to adapt to new customer requirements on a global market is of vital importance for a long-term success. Total quality management (TQM) has been documented and used by organizations all over the world to develop a quality focus and improve organizational performance. TQM requires changes in managers' and employees' beliefs, attitudes and behaviors to focus on continuous improvement (Mosadeghrad, 2015).

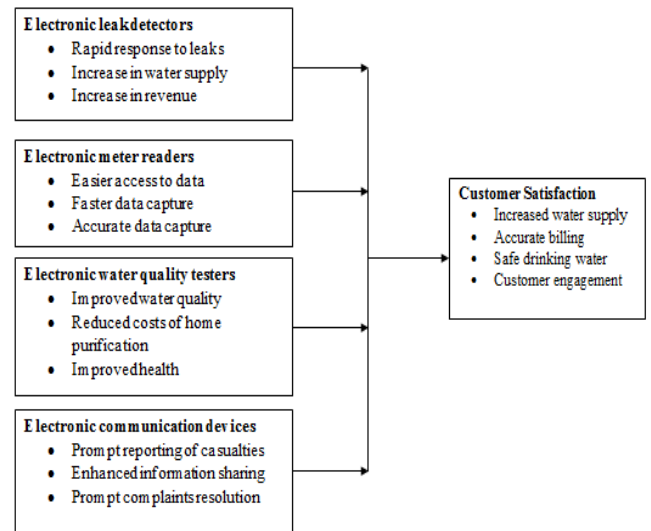
Total quality management (TQM) was deemed by many, a decade or so ago, to be a management movement; so significant that it was a paradigm change capable of completely reorienting corporate management responsibilities (Dayton, 2003). It was the answer to the product quality challenge from Japan and was to provide the interdepartmental connections and the sharing of information, goals, and responsibilities that would assure complete organizational realignment to customer needs (Dayton, 2003).

Conceptual framework

The Conceptual Framework concentrated on three key areas which effect customer satisfaction.

In the framework customer satisfaction was the dependent variable while technology enhanced NRW control, technology enhanced meter reading and technology enhanced communication were the independent variables.

The above conceptual framework denotes that customer satisfaction can be derived if an electronic monitoring system encompassing leak detection, meter reading, quality testing and smartphones is adopted by the Mombasa Water Supply and Sanitation Company. The variables were reviewed as hereunder.



Independent variables

Dependent variable

Fig. 1.2. Conceptual Framework.

Source: Author, (2017)

The above conceptual framework denotes that customer satisfaction can be derived if an electronic monitoring system encompassing leak detection, meter reading, quality testing and smartphones is adopted by the Mombasa Water Supply and Sanitation Company. The variables were reviewed as hereunder.

Use of electronic leak detectors

One of the biggest challenges that Mombasa Water Supply and Sanitation Company (MOWASSCO) faces is accounting for non-revenue water. Currently, the rate of non-revenue water for the utility stands at 48% (WASREB, 2015) which is exceptionally high considering the acceptable sector benchmark is between 20 to 25 percent (WASREB, 2014). Of the total amount of water received by the utility amounting to 15.341 Million liters only 5.026 Million liters are billed by the utility (WASREB, 2015). Non-revenue water is simply the difference in water volume supplied to the utility versus water billed by the utility. Water can be lost through bursts and leakages that occur within the water reticulation system, through illegal connections and through theft when parts of the water infrastructure is vandalized.

Bursts and leaks may occur due to the dilapidated nature of the pipes or due to poor quality of pipes used. Bursts may also occur when sections of the water reticulation infrastructure are vandalized. This includes air valves and meters. Many times the bursts and leaks occur in areas that are difficult to access and thus a huge volume of water is lost, long before the leak is detected. Sometimes the only indication of the existence of a leak might be the sprouting of water reeds or in serious cases development of small swamps or marshy grounds. Sometimes the pipes are intentionally punctured by unscrupulous persons in a bid to get free water.

This too happens in relatively secluded areas which may take a long time to detect. Lack of integrity amongst the employees of the utility has seen collusion between staff and customers to illegally connect customers to the water supply system; and where the money paid for connection is much less and is not even officially accounted for in the utility's books of account. Illegal connection may go undetected for a long time as these are un-metered.

Geographic Information Systems (GIS) can be adopted by the company to locate leaks and bursts. United States Geological Survey defines GIS as a geographic information system technology, which can be used for scientific investigations, resource management, and development planning (USGS, 2008). According to Koury, Downing and Semenza (2012) working with GIS involves using specialized software to display, analyze, and organize information, often utilizing maps or other visual displays, in addition to helping manage data. Illegal activities along the water reticulation system can be monitored using geo-mapping technology. Geo-mapping is an efficient tool in "spying" on activities and raising the alarm on illegal activities. Tracking, penalizing and controlling illegal activities would greatly reduce the incidence of non-revenue water thus increasing water supply which in turn would increase revenue. Increased revenue would then be injected back into operations and maintenance and improve the quality of services leading to increased customer satisfaction.

Use of electronic meter readers

One of the major complaints from customers is related to meter readings. Meter reading is a critical component of billing. Incorrect meter readings lead to incorrect billings. Majority of the complaints arising from meters include estimated bills over a long period of time, readings which are much higher than the amount of water used or non-functioning meters. Estimated bills can affect the revenue both negatively and positively. It is possible to under-bill the customer which negatively affects revenue or over bill the customer which improves revenue but of course at the expense of the customer who may end up raising a complaint. Moreover, the number of customers connected to the water system continues to grow. Inefficient meter reading will contribute to increased inefficiency of services, a myriad of customer complaints and finally to customer dissatisfaction.

Meter readers have been accused of getting compromised as they move from house to house to read meters. Monetary and even sexual favours have been known to take place in a bid to allow customers to remain connected despite having unpaid bills. This has negatively affected revenue of the water utility. Legal customers who are metered and who are ready to pay for the water get dissatisfied by the reduction in supply brought about by the high rates of non-revenue water (Kaushik & Rahman, 2015). The company incurs losses because the amount billed by the bulk water supplier (Coast Water Services Board) is much higher than what the utility bills the customers. This in turn affects the quality of services since revenue meant to be injected back into operations and maintenance is lost. Poor services leads to customer dissatisfaction. On the part of the utility, meter readers have been known to complain of inaccessibility and hostile receptions at customer's homes and offices during meter readings. Sometimes the meters are unreadable as they are submerged in water logged areas. In some places meters are locked indoors as owners go about their day to day businesses and are thus inaccessible for meter reading.

Some premises are guarded by ferocious dogs thus keeping away the meter readers.

MOWASSCO should adopt meter reading technology such as hand held electronic meter reading gadgets that can allow meters to be read from a specified radius. This would imply that the meter readers would be able to take readings without necessarily physically touching the meter to read it at close range. It would also be a faster way of reading the meters since the same devices could be attached to a motor vehicle which would pick readings as the cyclist moves around from one area to the other (Kaushik & Rahman, 2015). Apart from the speed the gadgets would ensure accurate readings.

Advanced meter reading technology such as the AMR (Automated Meter Reader) allows meter readers to read a meter without entering a customer's property (in many cases seen as a nuisance by customers); they simply drive a vehicle or motorcycle down the street. The meters transmit data using a one-way radio frequency. The radio signal is picked up by a "collector" inside the vehicle or motorcycle. The speed of reading and the accuracy of reading would translate to improved customer satisfaction as meter reading complaints reduce. Correct billings as compared to doubtful estimated bills would raise the confidence of customers and their satisfaction level.

Use of electronic water-quality testers

Water quality is a key issue in customer satisfaction. Customers are keen on receiving safe drinking water pertaining to smell, taste and colour. According to Yue, Shi, Luo, Zhang, Johnson and Zhao (2017) helping people access safe drinking water is one of the most important health-related infrastructure initiatives in the world. In addition to basic water quality parameters, such as dissolved oxygen (DO), conductivity, pH and nutrient status, new technological developments are required to allow sensitive and specific monitoring for a range of contaminants (Lawlor, Torres, O'Flynn, Wallace & Regan, 2012)

Capodaglio, Callegari and Molognoni (2016) attest that with constant advancements, real-time water monitoring and sensing technologies will become a progressively more important tool for evaluating water quality. Recent technologies are permitting rapid detection of water quality changes, environmental threats induced by waste loads, and other impacts. An alternative to chemical analyzers, traditionally adopted for this purpose, is the use of chemo sensors, which operate according to physical principles (e.g. light measurement), without sample collection (directly online) and can supply (surrogate) parameter values in real-time (Capodaglio et al., 2016). A significant number of complaints received by Mombasa Water Supply and Sanitation Company relate to water quality (Customer Complaints Report, 2015). Thus the utility must embrace technology that can test water quality in a quick but economical way with little effect on the price of water. This would greatly increase the level of satisfaction level of customers.

Use of electronic communication devices

According to Khudair and Raza (2013) improved communication can lead to better service and ultimately, improved customer satisfaction. Customers become frustrated when the product or service they had anticipated to receive is not forthcoming and where the service provider remains silent instead of offering an explanation. This greatly hampers the satisfaction level of the customer.

The customer today needs a service provider who is interactive and is customer focused. Organization's need to go an extra mile to retain customers by offering quality services. According to Parasuraman et al., (1988) part of the multiple-item scale for measuring service quality called SERVQUAL includes the component of empathy. Empathy refers to caring, individualized attention the firm provides its customers and finally tangibles relates to physical facilities, equipment, and appearance of personnel (Parasuraman et al., 1988). This goes to prove that companies must handle their customers with a lot of empathy which will translate to customers being highly satisfied (Khudair& Raza, 2013).

Today the communication gadget which has taken the world by storm is the mobile phone.

Kenya now has 37.8 million active mobile phone numbers with the Internet-cum-data market registering 21.6 million users (Daily Nation, January 7 2016). This is an indication of the preferred mode of communication by the public. The cell phone provides an easy and effective means of communication. MOWASSCO should thus embrace mobile phone technology to give customers text alerts on a myriad of issues ranging from water supply interruption notices to water savings tips and alerts for bill payments. The cell phone can easily close the communications gap and increase customer satisfaction.

Customer Satisfaction

According to Olsen, Witell and Gustafsson (2014) slogans such as "the customer comes first" or "the customer is king" are quite common in business terminology because these slogans are used to emphasize the role of the customer to the stakeholders such as owners and employees of a service firm. According to Kursunluoglu (2014) creating customer satisfaction and loyalty provides sustainable competitive advantage and differentiation from rivals. In the case of Mombasa Water Supply and Sanitation Company, customer satisfaction can be derived by adopting electronic water monitoring technology incorporating the use of electronic leak detectors, electronic meter readers, electronic water quality testers and electronic communication devices.

MOWASSCO should adopt the use of electronic leak detectors to control non-revenue water. The high rate of non-revenue water by the utility reduces the amount of water available for supply to the customers. As such the customers become dissatisfied with the service due to reduced water supply. Control of non-revenue water by use of electronic leak detectors will allow for more water to reach customers and thus the satisfaction level will improve.

Controlling NRW will ensure the quality of water is maintained due to less tampering of pipes through illegal activity. Activities such as illegal connections can contaminate water supply leading to poor product quality. According to Sudin (2011) satisfaction is understood to be predicted by service quality. Additionally the utility can

improve customer satisfaction by adopting technology in meter reading. Customer would be satisfied if water bills were actual consumed as opposed to being estimated. Manual meter reading can be prone to error as either readings are estimated (because readings were not physically done), thus causing bills to be over or under billed. The use of electronic meter reading technology would ensure improved services which directly links to customer satisfaction. Controlling NRW using electronic devices for meter reading and leak detectors will lead to an increase in water supply and thus water vendors will reduce the price of the product. A large percentage of the lower income consumers are not metered and rely solely on water vendors for their water supply.

Water vendors take advantage of scarcity in the commodity to inflate prices. This causes a lot of dissatisfaction to the customers. Satisfaction will be improved if the volume of water supply increases due to reduction in NRW which can be achieved through the use of electronic devices.

According to Shehata, Ellis and Foster (2015) in the past 20 years or so, new forms of communication channels have emerged to stand side by side with traditional channels. This underscores the importance of communication in both formal and informal situations. Holtzhausen, D (2016) attests that technological innovations, particularly in terms of capturing, aggregating, and processing vast and diverse volumes of data at greater speed, serve society and governments well in terms of managing infrastructure, monitoring diseases and public health, and even collecting more tax. In the case of MOWASSCO investing in electronic communication devices will improve communication with customers thus improving customer satisfaction.

Methodology

This study used descriptive research design. Descriptive research refers to a set of methods and procedures that describe variables. It involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data (Gichinga, 2015). The design was considered appropriate because it provided an in depth and comprehensive inquiry required to be conducted to have a description of the subject under study (Babbie & Mouton, 2011, Kothari, 2014). The population of interest for this study was the metered customers of MOWASSCO. Metering is divided into five (5) zones namely Island North, Island South, Likoni, Nyali and West Mainland. This study identified the 5 zones as the logical clusters and took a sample population of 600 customers from across the 5 (five) clusters. The target population was 600 because it was an ample representative figure as per data supplied by MOWASSCO.

The study used a sampling frame consisting of respondents from each of the 5 clusters represented by the metering zones.

Table 4.1. Mean and standard deviation for use of electronic leak detectors.

Use of Electronic Leak Detectors	Mean	Standard Deviation
MOWASSCO loses a lot of water through un-accounted for water (non-revenue water)	4.10	1.255
The use of leak detectors to control non-revenue water would improve the performance of MOWASSCO and lead to improved customer satisfaction	3.60	1.218
The use of electronic leak detectors can lead to quick response to leaks thus improve customer satisfaction	4.30	0.838
The use of electronic leak detectors will lead to more water reaching the customer and thus improving customer satisfaction.	4.08	1.020
Use of electronic leak detectors will lead to more water supplied, more revenue earned by MOWASSCO which will in turn improve services and boost customer satisfaction.	3.79	1.218
Electronic leak detectors should be periodically reviewed to gauge their role in increasing customer satisfaction.	4.40	0.838

This study thus used cluster sampling together with simple random sampling to select the 30% sample frame/size. According to Mugenda and Mugenda (2003) a sample size of 30% is a good representation of the target population. Gichinga (2005) explains that when using cluster sampling the population is first divided into clusters or groups as sample units rather than individuals and all the elements within the chosen cluster are examined and the sample is selected from these clusters by simple random method or systematic random sampling. The sample size of this study was thus 182 respondents.

To test whether technology has a role in improving customer satisfaction at MOWASSCO, a multiple regression model was used to determine the role of each variables with respect to the customer satisfaction at MOWASSCO.

The regression equation was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Y = the dependent variable (Customer Satisfaction)

β_0 = constant term

$\beta_1 X_1$ = independent variable (Electronic leak detectors)

$\beta_2 X_2$ = independent variable (Electronic meter readers)

$\beta_3 X_3$ = independent variable (Electronic water quality tester)

$\beta_4 X_4$ = independent variable (Electronic communication devices)

ϵ = error term

Research Findings

Use of electronic leak detectors

Use of electronic leak detectors was one of the independent variables. The objective was to measure the extent to which respondent's agreed to statements that using electronic leak detectors could result to an improvement in customer satisfaction levels. The findings of the Mean and Standard Deviation are shown in Table 4.1 below.

From Table 4.1 above, slightly over half the respondents were in agreement with the statement items under the variable as indicated by a mean ranging from 4.10, 4.30, 4.08 and 4.40 which showed a strong positive affirmation towards the statements that MOWASSCO loses a lot of water through non-revenue water and that the use of electronic leak detectors can lead to quick response to leaks and also allow for more water to reach the customer thus improving the level of customer satisfaction.

Respondents were also in agreement that the leak detectors should be periodically reviewed. The strong agreement by respondents is supported by Koury, Downing and Semenza (2012) who attested that working with GIS could help resolve remote technical challenges. However, at least a third of the respondents were non-committal as to whether the use of electronic leak detectors could lead to improved performance of MOWASSCO which in turn could positively impact on the levels of customer satisfaction. This is evidenced by the

Mean of 3.60. The respondents were also non-committal as to whether MOWASSCO earning more revenue as a result of using electronic leak detectors would lead to improved levels of customer satisfaction. This is seen by the Mean of 3.79

Use of electronic meter reading

Use of electronic meter readers was another independent variable. The objective was to measure the extent to which respondent's agreed with statements that improving meter reading using technology could result to an improvement in customer satisfaction levels. The findings of the Mean and Standard Deviation are shown in Table 4.2 below.

From the Table 4.2 it was noted that over a third of the respondents were generally in agreement with the statements under the variable. The respondents were in agreement that use of electronic meter reading would enable faster data capture leading to efficiency and improved customer satisfaction. The respondents agreed that embracing of electronic meter reading by MOWASSCO would allow meter readers to get easier access to meter reading and thus improve customer satisfaction. The respondents also agreed that the use of electronic meter readers would reduce costs, generate improved services which will lead to an increase in customer satisfaction. This is seen in the Mean of 4.30. However, a third of the respondents were non-committal as to whether adoption of electronic meter reading would allow for faster data capture and shorter billing cycles which would eventually improve customer satisfaction. The third of the respondents were also non-committal as to whether accurate data capture by using electronic meter reading would reduce conflicts with customers with regard to billing thus improve customer satisfaction.

Table 4.2. Mean and standard deviation for use of electronic meter reading.

Use of electronic meter reading	Mean	Standard Deviation
Electronic meter readers can allow meter readers to get easier access to meter reading and this will improve customer satisfaction.	4.30	1.253
Electronic meter reading will allow for faster data capture, shorter billing cycle and improved customer satisfaction.	3.80	1.215
Faster data capture using electronic meter readers will increase the efficiency of MOWASSCO leading to increased customer satisfaction	4.30	0.837
Electronic meter reading will enable accurate data capture in meter reading thus improving customer satisfaction.	4.07	1.015
Accurate data capture by using electronic meter readers will reduce conflicts with customers with regard to billing thus improve customer satisfaction.	3.80	1.215
Use of electronic meter readers will reduce costs, generate improved services and increase customer satisfaction	4.30	0.837

Table 4.3. Mean and standard deviation for use of electronic water-quality testers.

Use of electronic water quality testers	Mean	Standard Deviation
Quality of water a key component of customer satisfaction	4.27	0.828
The quality of water supplied by MOWASSCO is acceptable to me	4.36	0.922
The use of electronic water quality testers would improve water quality	4.26	0.828
I would incur less costs of home water purification if MOWASSCO adopts the use of electronic water quality testers.	4.33	0.844
I would have no problem with the increase in the price of water so long as the quality of water is improved by the use of electronic water quality testers	4.25	0.922
The use of electronic water quality testers would improve the quality of water which will in turn contribute to the good health of consumers.	4.32	0.837

Table 4.4. Mean and standard deviation for use of electronic communication devices.

Use of electronic communication devices	Mean	Standard Deviation
If MOWASSCO adopts electronic communication devices to communicate to customers the level of customer satisfaction will increase	4.27	0.828
Use of electronic communication devices can allow customers to report causalities like bursts and leaks promptly thus improving customer satisfaction	4.33	0.922
A well informed customer has a higher level of satisfaction.	4.33	0.844
MOWASSCO should use electronic communication devices for information sharing with customers in order to improve the satisfaction levels.	4.30	0.837
MOWASSCO has a defined mechanism for reporting complaints.	4.33	0.922
Prompt complaints resolution by the use of electronic communication devices will increase customer satisfaction.	4.27	0.828

Table 4.5. Mean and standard deviation for customer satisfaction.

Role of electronic water monitoring system in customer satisfaction	Mean	Standard Deviation
Electronic water monitoring system can increase the quantity of water supplied and thus increase customer satisfaction.	4.27	0.828
Electronic water monitoring system can allow for accuracy in water billing which will lead to an increase in the level of customer satisfaction.	4.40	0.894
Electronic water monitoring system will improve the quality of water thus increasing the level of customer satisfaction	4.20	0.805
Electronic water monitoring system will allow for real time engagement with customers thus improving customer satisfaction levels.	4.37	0.850

This is backed by a Mean of 3.80. It is thus deduced that the use of electronic meter reading could reduce dissonance inherent in the customer's perception and perceived performance of the service, thus backing up the Theory of Assimilation.

Use of electronic water-quality testers

Use of electronic water-quality testers was the third independent variable. The objective was to measure the extent to which respondent's agreed to statements that using electronic water-quality testers could result to an improvement in customer satisfaction levels. The results of the analysis are shown in Table 4.3

From Table 4.3 it was deduced that respondents were in agreement with the statements under the variable.

Respondents generally agreed that the use of electronic water quality testers by MOWASSCO, would lead to the general improvement of the quality of water which would lead to an improvement in the level of customer satisfaction. This was supported by the means of 4.27, 4.36, 4.26, 4.33, 4.25 and 4.32 for the statements. The strong affirmative Mean is supported by the Service Quality Model which provides an integrated framework for managing service quality. Gap 3 of the Delivery Gap arises as a result of the difference between the service provider's service standards and the actual service offered to customers. Gap 3 is bridged once the quality of the service or product equals the customer's expectations (Parasuraman et al. 1983-1988). The above statement also garnered standard deviations of 0.828, 0.922, 0.828, 0.844, 0.922 and 0.837 thus eventually the statements and final data from the respondents displayed a high dispersal thus providing an affirmative answer for the above statements.

Use of electronic communication devices

Enhancing communication using electronic communication devices was the fourth independent variable. The objective was to measure the extent to which respondent's agreed to statements that enhancing communication by use of electronic communication devices could result to an improvement in customer satisfaction levels. The results of the analysis are shown in Table 4.4

From Table 4.4 it was deduced that respondents were in agreement with the statements under the variable. Respondents generally agreed that the use of electronic communication devices by MOWASSCO, to communicate to customers increase the level of customer satisfaction. The devices could allow customers to promptly report causalities like bursts and leaks. Respondents were also generally in agreement that MOWASSCO had a well-defined mechanism for reporting complaints. This was supported by the means of 4.27, 4.33, 4.33, 4.30, 4.33 and 4.27 for the statements. The strong affirmative Mean was supported by Gap 4 of the Gap Model of Service Quality which relates to a breakdown of communication between the customers and the institution (Parasuraman et al. 1983-1988). This gap focuses on the difference between service delivery and what is communicated externally to customers through advertising, pricing, and other forms of tangible communications. The Gap can be closed by the use of electronic communication devices such as electronic updates and adjustments, customized communication strategies and the use of blogs, targeted e-mails, customer communities and employee chat with customers. The above statement also garnered standard deviations of 0.828, 0.922, 0.828, 0.844, 0.922 and 0.828 thus eventually the statements and final data from the respondents displayed a high dispersal thus providing an affirmative answer for the above statements.

Role of electronic water monitoring system in customer satisfaction

Customer satisfaction was the dependent variable. The objective of the analysis was to measure the extent to which respondent's agreed to statements that the use of electronic water monitoring system by MOWASSCO could lead to an improvement in the levels of customer satisfaction. The results of the analysis are depicted in Table 4.5

From the analysis as presented in Table 4.5 above, respondents were in general agreement that the use of electronic water monitoring system by MOWASSCO could allow for real time engagement with customers, thus greatly improving satisfaction levels. This is supported by the respective means of 4.27, 4.40, 4.20 and 4.37.

This supports the Total Quality Management Model (TQM) which advocates for a combined effort of both top level management as well as employees of an organization to formulate effective strategies and policies to deliver high quality products which not only meet but also exceed customer satisfaction, through embracement of technology. The TQM Model is a holistic approach of providing solutions under an integrated system of management with the aim of providing quality goods and services. The above statement also garnered standard deviations of 0.828, 0.894, 0.805 and 0.850 thus eventually the statements and final data from the respondents displayed a high dispersal thus providing an affirmative answer for the above statements.

Regression Analysis

The researcher used regression analysis to establish the relationships amongst the variables.

The focus was on the relationship between the dependent variable customer satisfaction and four independent variables electronic leak detectors, electronic meter readers, electronic water quality testers and electronic communication devices. A summary of the relationship is shown in Table 4.6

Table 4.6. Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.849(a)	.710	.688	.27951

a. Predictors: (Constant), ELD, EMR, EWQT, ECD

b. Dependent Variable: C_S

Multiple regression analysis was carried out to test the research objectives using the model equation $Y = \beta_1X_1 + \beta_2X_2 + \dots + \beta_nX_n + \epsilon$. As is shown in Table 4.5, 71.0% of the variations in the dependent variable were explained by the independent variable as measured by the goodness of fit (R-square). The model summary Table 4.5 presents the R, R², adjusted R², and the standard error of the estimate, which can be used to determine how well a regression model, fits the data. From the table, R squared is the fraction of the variation in dependent variable which is customer satisfaction that can be accounted for by the four independent variables used in the study.

ANOVA

The researcher used the ANOVA test to analyze the differences in the group means. The purpose of the test was to find out the role of electronic water monitoring system on customer satisfaction in MOWASSCO. The results of the test are shown in Table 4.7.

Table 4.7. ANOVA.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.041	4	1.760	22.531	.000(a)
	Residual	2.734	35	.078		
	Total	9.775	39			

a. Dependent Variable: C_S

b. Predictors: (Constant), ELD,EMR, EWQT, ECD

When the test was run at 0.05 significance level to test the fitness of the model in determining the role of electronic water monitoring system on customer satisfaction in public service institutions, the p value was 0.000. If p value (0.000) is less than α (0.05) then the result is significant.

4.7 Coefficient of determination

The researcher conducted a multiple regression analysis as shown in Table 4.8 to determine the relationship between customer satisfaction and electronic leak detectors, electronic meter readers, electronic water quality testers and electronic communication devices as independent variables

The regression equation was:

$$Y = .804 + 0.416X_1 + 0.009X_2 + -0.081X_3 + 0.184X_4 + \epsilon$$

Where

α : is a constant term,

β_n : coefficients to be determined

ϵ : the error term.

Y: the dependent variable (Customer Satisfaction)

X1: electronic leak detectors

X2: electronic meter readers

X3: electronic water quality testers

X4: electronic communication devices

According to the regression equation established in Table 4.8, taking all factors constant at zero, customer satisfaction will be 0.804. The data findings analyzed also shows that taking all other independent variables at zero; a unit increase in electronic leak detectors will lead to a 0.416 increase in

Table 4.8. Coefficients (a).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.804	.174		1.295	.002
	electronic leak detectors	.416	.223	.673	1.863	.001
	electronic meter readers	.009	.228	.026	.137	.004
	electronic water quality testers	.081	.071	.133	1.128	.267
	electronic communication devices	.184	.039	.431	4.694	.000

a. Dependent Variable: customer satisfaction

Table 4.9. Correlations.

			EM_REI_d	EW_QTCS	EC_D		
Spearman's rho	EM_R	Correlation Coefficient	1.000	.089	.842**	.244	.766**
		Sig. (2-tailed)	.	.233	.000	.001	.000
		N	182	182	180	182	180
	EL_d	Correlation Coefficient	.089	1.000	.249	.216	.196
		Sig. (2-tailed)	.233	.	.001	.003	.008
		N	182	182	182	182	182
	EW_QT	Correlation Coefficient	.842**	.249	1.000	.357	.392
		Sig. (2-tailed)	.000	.001	.	.000	.000
		N	182	182	182	182	182
	CS	Correlation Coefficient	.244	.216	.357	1.000	.796
		Sig. (2-tailed)	.001	.003	.000	.	.000
		N	182	182	182	182	182
	EC_D	Correlation Coefficient	.766**	.196	.392	.796	1.000
		Sig. (2-tailed)	.000	.008	.000	.000	.
		N	182	182	182	182	182

satisfaction of customers ; a unit increase in electronic meter readers will lead to a 0.009 increase in satisfaction of customers; a unit increase in electronic water quality testers will lead to a 0.081 increase in satisfaction of customers; a unit increase in electronic communication devices will lead to a 0.184 increase in satisfaction.

The study found out that there was a significant relationship between electronic leak detectors (0.001), between electronic meter readers (0.004) and electronic communication devices (0.000). There was an insignificant relationship between customer satisfaction and electronic water testers (0.267S)

Correlations

Correlation analysis is a statistical technique used to indicate the nature and degree of relationship existing between one variable and the other(s). In this study, the Person's Coefficient of Correlation was used to study the relationship between variables. Table 4.8 shows the results of the correlation analysis.

From Table 4.9 above it was deduced that there was a strong positive coefficient of correlation of 0.796 between customer satisfaction and electronic communication devices indicating that electronic communication devices had a strong influence and positive effect on customer satisfaction within MOWASSCO. There was a sufficiently high degree of correlation of 0.357 between customer satisfaction and electronic water quality testers indicating that electronic water quality testers had a strong influence on the customer satisfaction within MOWASSCO. There is also a sufficiently high degree of correlation of 0.216 between customer satisfaction and electronic leak detectors indicating that electronic lead detectors have a strong influence on the customer satisfaction within MOWASSCO. There was also a sufficiently high degree of correlation of 0.244 between customer satisfaction and electronic meter readers indicating that electronic meter readers had a strong influence on the customer satisfaction within MOWASSCO.

Conclusions

According to Jan and Abdullah (2014) in today's information rich era where customers are the nexus of every business, many companies are forced to adopt the required technologies in order to satisfy the customers. This study has confirmed the positive role of technology in increasing the satisfaction levels of customers. MOWASSCO should adopt technology in its service delivery in order to improve satisfaction levels. Erroneous meter reading, Non-Revenue water leading to low water volumes supplied and poor communication are some of the key service delivery areas that account for poor customer satisfaction. The study revealed that MOWASSCO can resolve the outlined challenges in service delivery by the use of technology. Electronic meter reading, GIS tracking of illegal connection, leaks and bursts, sharing of information on an online basis and resolving of complaints using an online platform, would greatly improve service delivery for MOWASSCO which would eventually lead to improved customer satisfaction.

Recommendations

Adoption of technology by MOWASSCO can improve service delivery and lead to improved customer satisfaction. However, MOWASSCO should also ensure that its employees are well trained and properly acquainted with technologically innovative ways of service delivery. Acquiring technology for monitoring and controlling NRW

would be key in alleviating challenges encountered in service delivery such as illegal connections, bursts and leaks. MOWASSCO should also adopt technology in meter reading as this is an efficient and cost effective way of capturing data to be used in billing. Challenges of estimated or incorrect bills and those encountered during physical meter reading would be resolved, leading to improved customer satisfaction. MOWASSCO must also embrace technology in its communication platform to allow for ease and speed in resolving customer complaints as well as in sharing of information. This would greatly improve the level of customer satisfaction

Suggestion For Further Research

Based on the findings and conclusion of the study, the following areas have been suggested for further study. A study of the service delivery challenges in other public service institutions that deals or does not deal with water supply as this research was solely based on only one water supply, MOWASSCO. Each service areas has its own unique characteristics and it would be insightful to research on other areas of service delivery in or outside the Coastal region. It is also suggested that the role of technology when used in other variables that have not been picked in this study be analyzed to gauge their effects on customer satisfaction. For instance it would be interesting to find out the role of technology with the customer as the point of focus instead of the institution; that is, how customers can use technology to increase their satisfaction levels.

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