
THE ROLE OF DECISION MAKING ON THE MANAGEMENT OF WATER SUPPLY IN MURANG'A COUNTY, KENYA

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ABSTRACT

Purpose of the Study: To establish the role of decision making on the management of water supply in Murang'a County, Kenya. To achieve sustainability in water projects, there must be full participation in decision making by all individuals or representatives in all stages of project management.

Statement of the Problem: The mounting evidence indicates that the centrally managed schemes in Kenya are difficult to implement and operate when the communities served are disperse, remote, and relatively small and lack the financial resources and physical social infrastructure needed to support development or to maintain new systems.

Methodology: Interpretivist research philosophy was used and descriptive study design adopted. The target population comprised of the local stakeholders or the beneficiaries (households), water supply and management organizations staffs, National and County Government officials from the Ministry of Water and staff of non-state actors dealing with water in Murang'a County giving a total population of 89,415. This study used a sample size of 225 respondents. This study utilized a self-administered research questionnaire to gather both qualitative and quantitative data. SPSS version 25 was used to aid in data analysis. The regression model was used to measure the relationship between the variables.

Result: The findings revealed that decision making was satisfactory in explaining management of water supply in Murang'a County with R coefficient of 0.765 indicating that decision making as the independent factor had a correlation of 76.5 percent with the dependent variable management

of water supply. Regression coefficients results revealed that decision making was positively and significantly related to Management of Water Supply ($\beta=0.812$, $p=.000<.05$).

Conclusion: Decision making in water supply management requires the delivery of accurate scientific information needed in the management. However, involvement of local stakeholders in Murang'a in matters of decision making is still a challenging affair since most of the local community members still feel they are not properly involved in making decisions with regards to the management of water supply in the county.

Recommendation: Stakeholders in the management of water in Murang'a County should strive to involve the local community and beneficiaries of water services in decision making since they need to be involved in every stage of the management of water supply in the County.

Keywords: *Decision making, Management, Water, Supply, Murang'a, Kenya.*

BACKGROUND TO THE STUDY

To achieve sustainability in water projects, there must be full participation by all individuals or representatives in all stages of project management. Finch (2015) indicated that community engagement is a governance approach that has many benefits: namely, citizen empowerment; the generation of new, diverse and innovative ideas and actions on performance; enhancement of citizen governments' relations; appropriate prioritization of development projects; improved delivery of public services and; promotion of governments' responsiveness. Wehn, Collins, Anema, Basco-Carrera and Lerebours (2017) assert that community engagement is the involvement of people in the community in solving community problems.

Akhmouch and Clavreul (2016) posit that the depth of engagement is more important for the sustainability of water projects in a community. The degree of community participation during planning and decision making has a direct positive impact on community project satisfaction. Like van Buuren, Driessen, Teisman and van Rijswick (2014) put it; community participation is merely a process of taking part in diverse spheres of societal life: economic, political, social, cultural and others. Effective engagement of stakeholders brings benefits to projects by reducing conflicts and increasing cooperation between the organizers and the community (Wehn & Evers, 2015).

In order to maximize the benefits of the engagement process, trust and credibility should be reinstated into the community (Haiyan, 2018). The government, organizing body and the community trusted personnel (clergy, community leaders, parents and teachers) should realize the link between success, trust and credibility. According to Ho et al., (2014), the greater the community trust for the organizing the bodies the more likely they are to embrace any aspect of the engagement process and vice versa. Unfortunately, this is a major challenge because most communities have little or no trust for the government and its allies (Wehn, McCarty, Lanfranchi & Tapsell, 2015).

In their review of community engagement in drinking water supply management, Megdal, Eden and Shamir (2017) indicated that community engagement is an important component of sustainable water supply management because it provides on the one hand an avenue to establish the needs of communities and on the other hand ensures the buy-in and trust into systems developed by government authorities to deliver services. Active community engagement relies on communities wanting to engage and contribute to the management and governance of services and on governance structures seeking pro-actively such engagement (Van Rensburg & Barnard, 2019).

One of the United Nation's 2000 Millennium Development Goals (MDG's) is to increase the proportion of the world's population that has access to safe drinking water and basic sanitation. Kadurenge, Nyonje, Onguko and Ndunge (2016) in a research on the evolving nature of community participation in public development projects in Kenya revealed that the insufficiency of water supply is an important drawback that may discourage and slow down further investment in Kenya and other developing countries. The following sections are concerned with the arguments on role of local stakeholder in management of water supply in the global, regional and local scenes.

Globally, there are more than 1 billion people in the developing world that are unable to access, on a daily basis, a reliable source of clean, freshwater (Rolston, Jennings & Linnane, 2017). Esera (2014) pointed that the challenge of water for all is one that has taken on renewed interest through the declaration of the Millennium Development Goals, which has, the specific target, of reducing by half the proportion of people without sustainable access to safe drinking water by 2015. Although the world met the MDG drinking water target of 88% in 2010 since by 2012, 89% of the global population had access to an improved drinking water source, but still 748 million people—mostly the poor and marginalized still lack access to an improved drinking water source (Lucas, Klas, Berit, Ulla & Jerker, 2018). Of these, almost a quarter (173 million) relies on untreated surface water, and over 90% live in rural areas.

As per Rehema, Juliette, Mariella and Sharon (2018), it was well noted that significant proportion of the world population (87%) has got access to safe drinking water, which is accounted for a progress of 10% within the last two decades. Concerning countries safe drinking water access worldwide, it was estimated that a little over 10 countries do have less than 50% access. If current trends continue, there will still be 547 million people without an improved drinking water supply in year 2015. Carr, Blöschl and Loucks (2012) carried out an evaluation on communities in water resource management in the European Water Framework Directive and the U.S Clean Water Act and revealed that public and stakeholder in water resource management is required and this aims to enhance resource management and involve individuals and groups in a democratic way (Garfin *et al.*, 2015).

EurEau (2017) reported that the total volume of water supplied in the EU is 44.7 billion m³ per year. There are significant differences among European countries the United Kingdom, Sweden, France and Germany had the highest amount of freshwater resources, with long-term annual averages ranging between 172.9 and 191.0 billion m³. European Environmental Agency- EEA (2014) indicated Public Participation (PP) is viewed as a means of improving water resource management through better planning and more informed decision-making. In 2015, freshwater abstraction by public water supply ranged across the EU Member States from a high of 159.1 m³ of water per inhabitant in Italy down to a low of 31.3 m³ per inhabitant in Malta.

Ngilambi and McCubbin (2017) in a documentation of effective implementation of community based water safety plans and stakeholders engagement process in Afghanistan reported that the majority (78% to 80%) of Afghans live in rural environments where conditions are the most basic and don't have access to water piped into their premises or treated before distribution let alone the capacity to regularly monitor water quality. Community water supply is so far established as the principle service delivery model in rural areas in Afghanistan voluntary Water Supply and Sanitation User Groups (WSSUG) or Community Development Councils (CDC)/Water Supply User Committee (WSUC) as executive committees are tasked with operation and maintenance of the system.

Acheampong, Swilling and Urama (2016) reported that in many African countries, the drinking water supply is still an open issue with only 68% of the population having access to improved sources of drinking water. Dyer, Stringer, Dougill, Leventon, Nshimbi and Chama (2014) affirmed that the situation of water supply shortage is much worse in the rural areas where coverage is only 50%, compared to 86% in urban areas. Rehema, Juliette, Mariella and Sharon (2018) concurred that by 2025; at least 48 countries are expected to be facing water shortages. No fewer than 22 of these are in Sub-Saharan Africa, which means that approximately 2.8 billion people (35% of the projected world population) will be living either in water-scarce areas (less than 1,000 cubic metres/cap/yr) or in water-stressed areas (between 1,000-1,700 cm/cap/yr).

McNicholl *et al.*, (2017) asserts that water availability in the African continent is restricted by a trend towards urbanization, poor or no city planning, a lack of resources and competition for available freshwater between sectors such as industry, municipal water and agriculture. About 884 million people worldwide, out of which Africa accounts for more than 37% of this figure, are still using drinking water from unsafe supply spots (Acheampong *et al.*, 2016). Acceleration in the competition of the main water uses, domestic, industrial and agricultural calls for effective and sustainable water resources management.

Given the weak economies in the African countries it is evident that they will still encounter the predicaments in the issues of natural resources water being one and the most vital of them all. McNicholl, McRobie and Cruickshank (2017) indicated that population increase in sub-Saharan Africa and parts, has been a crucial point in projections of resources trends. Water supply services in Zambia vary widely from one settlement to another even within the same town. Water supply systems have been poorly maintained in the last 20 years because local authorities and ministry departments as providers have absconded their capacity and professionalism to operate and sustain these services efficiently and effectively (Acheampong, Swilling & Urama, 2016).

According to Africa Development Bank (2013) Sub-Saharan Africa experiences a contrasting case with 40% of the 783 million people without access to an improved source of drinking water from the region. As such, Sub-Saharan Africa is far from meeting the United Nations Millennium Development Goal on water with just 61% water coverage against a target of 75% set for the region (McNicholl *et al.*, 2017). An analysis of data from 35 countries in Sub-Saharan Africa shows significant differences between the poorest and richest population in both rural and urban areas. Over 90% of the richest group's in urban areas use improved water sources and over 60% have piped water on premises. In rural areas, piped-in water is non-existent in the poorest 40% of households and less than half of the population use some form of improved source of water (Jacobsen, Michael & Kalanithy, 2012).

As per Olugboye (2017), rural water projects in Nigeria have suffered from poor co-ordination, poor maintenance culture, and lack of community ownership, poor technical and institutional structure and over bearing bureaucratic control by various supervising ministries. In Kalomo Zambia, the local community was mobilized to manage provision of water services, whereby villagers protected a catchment area by building a fence around borehole and regular cleaning of water point (McNicholl *et al.*, 2017). In Ghana, the Integrated Water Resources Management Project in the Volta involved the local communities and realized their traditional catchment management skills by declaring the whole catchment and its wooded vegetation as a sacred (McNicholl *et al.*, 2017). Closer home, local communities in various areas of Tanzania have developed coping strategies to ensure conservation of water resources (Msuya & Lalika, 2018). However, some of the traditional strategies have been eroded by modernization factors and

population pressure to the extent of affecting water quantity and quality. Mekuriaw and Gurmessa (2020) in a study of rural water supply management and sustainability in Adama area in Ethiopia established that the community members in the study communities take the lead in initiating the project idea of the water supply scheme.

Spaling, Brouwer and Njoka (2014) in a research on factors affecting the sustainability of a community water supply project in Kenya reported that for decades, water scarcity has been a major issue in Kenya, caused mainly by years of recurrent droughts, poor management of water supply, contamination of the available water, and a sharp increase in water demand resulting from relatively high population growth. Echoing the same Kwena and Makori (2015) reiterated that the Kenyan portion of people without safe drinking water is close to 3% of the global figure. In comparison to neighboring Uganda which had similar water coverage two decades ago at the advent of water reforms in both countries, Kenya's water coverage remained sluggish after the reforms despite its economy being double that of its neighbour but with comparable size of population and land size. There are convincing reasons to believe that Kenya should have met its water targets including those of the MDG.

Lillian and Mutiso (2019) in a study of determinants of Sustainability of Water Projects at Machakos County in Kenya revealed that planning and implementation, community management, cooperation of stakeholders and financial management influence sustainability of water projects. Proper management of water supply, lack of the right skills, poor leadership and lack of top management support leads to poor management of water supply. Mwando (2015) in an assessment of stakeholder participation in water resources management in Machakos Sub-County, Machakos County, Kenya indicated that the key stakeholders in water resources management in the Sub-County were; WRMA, NEMA, CAAC, TanaAthi WSB, SHGs, MUWASCO, WRUAs, TARDA and private water service providers.

However, the mean quantity of water available for domestic use from household constructed sources was significantly lower than the recommended BWR of 50 litres/ person/ day. In addition, most of the household heads participated in community water resources management activities despite not belonging to community- based water associations (Mwando, 2015). From their study on the costs of coping with poor water supply in rural Kenya Cook, Kimuyu and Whittington (2016) reported that there is a significant relationship between training in water resources management and the impact one made in water resources management activities.

Cook, Kimuyu and Whittington (2015) in a research of the costs of coping with poor water supply in rural Kenya revealed and stated preference methods to estimate the value of source protection in rural Kenya; although coping strategies, especially water treatment and water collection times, are a central component of the study, coping cost estimates are mentioned only briefly. Chepyegon and Kamiya (2018) studied the challenges Faced by the Kenya Water Sector Management in Improving Water Supply Coverage and established that despite the efforts of the Kenyan government to increase water coverage throughout the country so that economic development of the nation remains unimpeded, the rate of water supply improvement is unlikely to support the nation's long-term development goals. This research focuses on Murang'a County as the context of study.

STATEMENT OF THE PROBLEM

According to Water Services Regulatory Board (2016) the mounting evidence indicates that the centrally managed schemes in Kenya are difficult to implement and operate when the communities

served are disperse, remote, and relatively small and lack the financial resources and physical social infrastructure needed to support development or to maintain new systems. Chepyegon and Kamiya (2018) established that out of a population of about 40 million people in Kenya, about 17 million (43%) do not have access to clean water. While the role of the private sector tends to focus on companies delivering water supply and sanitation, business companies have paid increasing attention to water governance in their strategies, especially to cope with regulatory risks and secure water allocation (Kwena & Makori, 2015). In parallel, citizens and users' associations have gained increasing influence over political decisions on water. Local studies (Spaling, Brouwer, & Njoka, 2014; Kwena & Makori, 2015; Chepyegon & Kamiya, 2018) have shown that despite increased government investments in the water sector (from \$5 million to \$450 million in 10 years), access to water and sanitation services still remains low at 56% and 70% respectively; well below the Sustainable Development Goal (SDG) targets.

Murang'a County is located in one of the major water catchment areas in Kenya. However, only 41% of its residents are supplied with improved sources of water (CHS, 2018). This leaves a major proportion of its population without access to water supply hence resorting to other sources of water. There have been inconsistencies on the findings on the role of local stakeholders in management of water supply in Kenya. Omarova, Tussupova, Hjorth, Kalishev and Dosmagambetova (2019) Rolston, Jennings and Linnane (2017) and Wehn et al., (2015) reported that many countries have realized several positive changes in water supply after implementing strategic development goals however, Chepyegon and Kamiya (2018), Nyanje and Wanyoike (2016), Kwena and Makori (2015) conflicted with the argument painting Kenya as a country that lags behind schedule in meeting this goal. Murang'a County has been selected particularly due to the emerging issues regarding water sourced from the County and supplied in Nairobi County, leaving local stakeholders unable to enjoy the benefits of supply of the water resource. In addition, Murang'a County has encountered persistent water problems due to rapid population growth against poor management of existing water supply networks. It is against this backdrop that the current study sought to address the knowledge, methodological and contextual gaps by establishing the the role of decision making on the management of water supply in Murang'a County, Kenya.

RESEARCH OBJECTIVE

To establish the role of decision making on the management of water supply in Murang'a County, Kenya.

RESEARCH HYPOTHESIS

H₀: There is no relationship between decision making and management of water supply in Murang'a County, Kenya.

Theoretical Review

Cognitive Engagement Theory

Cognitive Engagement Theory was established by Bussey and Bandura (1999). The main idea of this theory is that participation depends on citizens having access to information about politics and government, and their desire to use that information in decision making. It is the increase in the levels of education that helps citizens to acquire and process large amounts of information, it is considered that education provides skills in many areas like the area of technology while at the same time increases the individual's ability to analyze it further (Shea & Bidjerano, 2009), making the informed citizen to be a "critical citizen". However, education makes citizens' dissatisfaction

with the state to manifest in forms of unconventional participation, such as protest (Ma, Wang, Wang, Kong, Wu & Yang, 2017).

The key themes that explain this theory are: education, use of media, interest in politics and political knowledge, and satisfaction / dissatisfaction policy. According to Garrison (2016) education is measured in levels from low to high; use of media in political knowledge is whether citizens understand how the political system works; and satisfaction / dissatisfaction policy refers to public attitudes about the performance of the system to deliver benefits to the citizens (Garfin *et al*, 2014). Critics to this theory suggest that this theory does not explain why once individuals have acquired all the information they would be motivated to use it to act in an informed manner.

In Murang'a County, water management organizations and institutions are facilitators of the project as they plan, design, implement and monitor maintenance through committees which are responsible for managing the schemes. The communities are most often engaged in the management of the supply systems at different levels as they participate through contributions either in cash or kind coordinated by members of the community, and also take part in decision making. Accordingly, citizens are able to acquire and process information, but in the absence of incentives it is not clear why they would be motivated to participate.

Local stakeholders' engagement in water governance is more about interactive relationship between different actors to create opportunities and solve problems. Engagement in water supply management is also about the way in which actors see the water governance landscape and interpret what is happening and what the causal mechanisms are that influence the practice of water governance. This theory if applied in relation to community engagement in governance systems will highlight the knowledgeable ability of the local stakeholders hence ability to make informed choices in water supply management.

Empirical Review

Chan et al (2013) in an investigation of decision maker perceptions of water quantity and supply side management in western North Carolina reveal that there is only low level concern about water quantity, and this drives a continued emphasis on supply side management and no perceived need for hydrological data. The historical realities of low demand and abundant water have generated a perception of 'water supply' as disconnected from physical, hydrological systems and allowed for ad hoc decision making processes to prevail. The lack of well-established processes may, ironically, provide significant opportunities for employing collaboration among researchers and decision makers to develop policies and processes that integrate data into making water management decisions and thus prompt increased attention to water demand.

Larson, White, Gober and Wutich (2015) studied decision making under uncertainty for water sustainability and urban climate change adaptation in Phoenix, Arizona, U.S.A and affirmed that The complexities involved with human environment systems have contributed to the challenges of utilizing scientific understanding for decision making insights. The large uncertainties associated with data and modeling have impeded the capacity of decision makers to translate expanding knowledge about the climate system into adaptive actions.

Mala and Komlan (2015) indicated that water regulation in India has traditionally been very little public and local community in water resource management. Major changes have taken place in the past couple of decades from different perspectives. On the one hand, the international participatory agenda has been reflected in the adoption of a series of policies and laws emphasizing the need for fostering the participation of water users. Uncertainty quantification is seen as a strategy to produce

risk based assessments, and thus, to facilitate informed decision making. Rising industrial and commercial demand linked to industrialization and rising incomes for some have nourished expectations of higher quantities and better quality of water, increasing pressure for improved water management policies and implementation (Rolston et al., 2017). Rapid urbanization is accompanied by poor urban planning and expanding slum populations.

Roach (2016) a study of decision making methods for water resources management under deep uncertainty revealed that with increasing water stress and water scarcity, information requirements and data collection needs will increase dramatically. The rapid growth of computerized information systems has had a major influence on data acquisition in general and on the utility of information. Hatfield, Marino, Whyte, Dello and Mote (2018) has warned that greater knowledge about climate system with respect to important relationships and feedbacks and the use of empirical data to initialize system conditions may have the paradoxical effect of increasing, not decreasing, uncertainty for certain system parameters and dynamics, which is problematic for decision makers.

Nyanje and Wanyoike (2016) allude that governments in most countries have realized that the centralized system is no longer reliable in this sector in supplying the local communities with potable water, they have thus engaged in the decentralized system acting as facilitators rather than just providers and encouraging communities to develop and/or manage their water systems through policy reforms. Rolston *et al.*, (2017) undertook a survey of current opinion on water management and community initiatives in the Republic of Ireland and the United Kingdom (UK). They indicated that water resource management is moving from the traditional top-down approach to more integrated initiatives focusing on community-led action. Water supply in most developing countries is being donated by external funds from national and international agencies like the World Bank, international NGOs as well as government in most countries as a means of alleviating poverty.

CONCEPTUAL FRAMEWORK

Figure 1 shows the conceptual framework depicting the relationship between decision making as an independent variable and the dependent variable management of water supply.

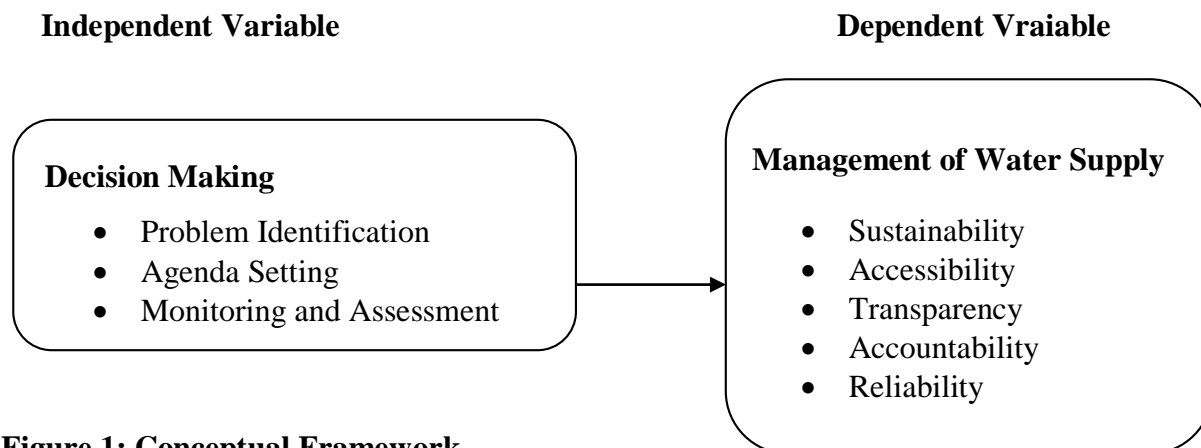


Figure 1: Conceptual Framework

RESEARCH METHODOLOGY

The study used both the qualitative and quantitative methodology approach by using a deductive form of logic wherein concepts, variables and hypothesis were chosen a priori and remain fixed throughout the study. This study adopted a descriptive research design. Owing to the vast nature of the area under study, the research was confined to the management staff and committee members of water supply organizations, national and county government officials from the Ministry of Water, Staff of non-state actors dealing with water, local stakeholders (e.g. household heads) and beneficiaries of the water services as well as staffs of the social amenities and corporate institutions in the County. The target population was 89,415. This study used a mixture of sampling techniques due to the nature of the population involved. From the categories of management staff and committee members of water supply organizations, National and County Government officials from the Ministry of Water and staff of non-state actors dealing with water the study selected the sample using proportionate random sampling. To arrive at the sample the target population following xxx formula by was used;

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

Where;

n represent sample size

N is population size

C is coefficient of variation at (95%) confidence limit

e is the standard error of 5%.

$$\begin{aligned} &= \frac{89415 \cdot .95 \cdot .95}{.95 \cdot .95 + (89415 - 1) (.05 \cdot .05)} \\ &= 225 \end{aligned}$$

By means of the above formula a total of 225 respondents formed the sample size for this study. This study used primary data which was collected using both semi-structured questionnaire and in depth interview schedule. This study utilized research questionnaire showing basic outline questions that identified the role of local stakeholders in management of water supply in Murang'a County. This study collected quantitative and qualitative data using a self-administered questionnaire and an indepth interview schedule. Descriptive statistics such as the mean scores, standard deviations, percentages and frequency distributions were computed to describe the characteristics of the variables of interest in the study. Descriptive statistics provides the basic features of the data collected on the variables under study and provides the impetus for conducting further analysis on the data (Mugenda, 2008). SPSS version 25.0 was used to aid in data analysis and the results were presented in form of tables and charts for easy understanding and interpretation. Before the questionnaire is distributed the participants were assured of confidentiality. Informed consent is whereby the participants of the study were made fully aware of the purposes of the study and how their information was used. Upon understanding the purpose of the study the participants had an option to agree to participate voluntarily with full understanding or decline. Upon understanding and agreeing the participants were requested to fill out the consent form before proceeding to answer the questions. There was no obligation to participate in the study therefore the participants can opt not to fill in the questionnaire.

FINDINGS AND DISCUSSION

DESCRIPTIVE STATISTICS

The study administered 225 questionnaires out of which 185 questionnaires were duly filled and returned. This translated to a response rate of 82.22 percent. In addition, all the 12 interview schedules were responded to giving a response rate of 100%. The study found that most (32.90%) of the respondents were between the ages of 46-50 years, 20% indicated that they were aged 51 years and above. The results also show that 18.80% of the respondents were between 36-40 years, 16.50% was between 31-35 years, 8.20% of the respondents indicated that they were aged between 41-45 years. In addition, the results revealed that 2.40% of the respondents were aged between 26-30 years, while only 1.20% were aged 25 years and below. More than a half of the respondents who took part in this study were management staffs and committee members of water supply organizations in Murang'a County. The results also show that 28.2% of the respondents were county government officials from the ministry of water, while 18.8% of the respondents indicated that they were national officials from ministry of water. The results imply that most of the respondents involved in this study were staff in water supply organizations since they were more involved in matters of management of water supply in the County and therefore were the relevant persons to obtain information about management of water supply from. Majority (62.40%) of the respondents were bachelor's degree holders, 16.50% of the respondents indicated that their highest academic qualification was master's degree. The results also show that 10.60% of the respondents were college certificate or diploma holders, 8.20% of the respondents were PhD holders, while only 2.40% of the respondents were secondary certificate holders.

The study found that most (59%) of the respondents had tertiary as their highest level of education, 24% had secondary school as their highest level of education, 10% had no formal education, while 7% of the stakeholders indicated that they studied up to primary school level. Most (30.6%) of the respondents had a working experience of between 6-10 years, 23.5% of the respondents had between 0-5 years working experience. The results further show that another 23.5% of the respondents had a working experience of between 11-15 years, 14.1% of the respondents indicated that they had a working experience of between 16-20 years. According to the results, only 8.2% of the respondents had more than 20 years working experience in the management of water supply in Murang'a County. Most of the respondents (50.6%) indicated that they had lived in Murang'a County for between 0-5 years, 29.4% indicated that they had lived in the area for a period of between 6-10 years. In addition, the results revealed that 11.8% of the respondents had lived in the area for between 11-15 years. According to the results, 5.9% of the respondents had lived in Murang'a County for between 16-20 years, while only 2.4% had been residence of the county for more than 20 years. The results imply that most of the respondents were not regular residence of Murang'a County who probably just went there to work. Table 1 depicts descriptive statistics results. Descriptive statistics are presented in Table 1.

Table 1: Descriptive Statistics

Statement	SA	A	U	D	SD	Mean	SD
Decision making affect the management of water supply in Murang’a County to a great extent.	2.40%	2.40%	0.00%	47.10%	48.20%	4.365	0.814
Identification of water issues affects management of water supply in Murang’a County to a great extant.	2.40%	1.20%	0.00%	44.70%	51.80%	4.424	0.777
Prioritization of set goals/objectives affects the management of water supply in Murang’a County to a great extent.	2.40%	1.20%	0.00%	54.10%	42.40%	4.329	0.762
Monitoring and Assessment of water projects affects the management of water supply in Murang’a County to a great extent.	2.40%	2.40%	0.00%	41.20%	54.10%	4.424	0.822
Proposal of alternative solutions affects the management of water supply in Murang’a County to a great extent.	2.40%	2.40%	0.00%	37.60%	57.60%	4.459	0.825
Consultations on water projects to be initiated is important in the management of water supply in Murang’a County.	2.40%	1.20%	0.00%	40.00%	56.50%	4.471	0.781
Average						4.412	0.797

As indicated in Table 1, majority (95.30%) of the respondents disagreed that decision making was affecting the management of water supply in Murang’a County to a great extent. The results imply that decision making was considered to have no effect on management of water supply in

Murang'a County by majority of the respondents; however their responses were sharply varied as indicated by the standard deviation. This was against the beliefs of respondent N6 that:

Currently the biggest challenge is convincing the community that they are encroaching on riparian land. They usually uproot the trees that the agency plant. Lack of youth willing to join the management of water supply initiative. No matter how much we try to sensitize the youth in joining the initiative, only a few of them are willing to join despite being majority in the population

The results also show that majority (96.50%) of the respondents believed that identification of water issues was not an important aspect of decision making which they indicated was not affecting management of water supply in Murang'a County to a great extent. This results imply that most of the respondents were positive that identification of water issues was to a little or no extent important in management of water supply in the County. However, respondent N7, Project Director of the Japan International Cooperation Agency (JICA) asserted that:

Currently we partner with the local government and other water agencies and even local groups involved in the management of water supply through identification of water issues. The objectives of our partnerships are drilling of boreholes, installation of pumps and construction of storage tanks and public tap-stands. All the on-going projects in these regions target a total of 326 boreholes to be drilled and developed together with water supply facilities including reservoirs, elevated tanks, and transmission and distribution pipelines. In Murang'a County project to improve rural water supply from surface sources is currently under construction. In addition, major water supply projects are being undertaken in the area to augment water supply in Mount Kenya regions.

The results further show that 96.50% of the respondents were not convinced that prioritization of set goals/objectives affected the management of water supply to a great extent. In addition, the results reveal that 95.30% of the respondents were of the opinion that monitoring and assessment of water projects was not affecting the management of water supply in Murang'a County to a great extent. The result imply that most of the respondents believed that this aspect of decision making was to a great extent important in the management of water supply in Murang'a County. Similarly, the results show that majority (95.20%) of the respondents were in disagreement with the statement that proposal of alternative solutions was affecting the management of water supply in Murang'a County to a great extent. Will reacting to the same statement, respondent N5 in an interview indicated that:

We are working in every major area of development, we provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. The World Bank's work in Kenya supports the government's Vision 2030 development strategy, which aims to accelerate sustainable growth, reduce inequality, and manage resource scarcity. Water is at the center of economic and social development; it is vital to maintain health, grow food, generate energy, manage the environment, and create jobs. Water availability and management impacts whether poor girls are educated, whether cities are healthy places to live, and whether growing industries or poor villages can withstand the impacts of floods or droughts.

This implies that, much as there are proposals of alternative solutions in the management of water supply in Murang'a County, they are not influencing the management of water supply to the extent

they would be expected to. Finally, majority (96.50%) of the respondents were of the opinion that consultations on water projects to be initiated was not important in the management of water supply in Murang’a County. The results imply that most of the Murang’a County residence believe this aspect of decision making affected management of water supply to a little or to no extent which was inconsistent with the assertion by respondent N4 who indicated that:

We are fully focused exclusively on ensuring equitable access to safe water, sanitation and hygiene education (WASH) for the world's poorest communities and this is what we are doing in Murang’a County as well. Our other duties are to promote and secure poor people's rights and access to safe water, improved hygiene and sanitation; support governments and service providers in developing their capacity to deliver safe water, improved hygiene and sanitation, involving the community in decision making process in which they are supposed to present their suggestions for action by our team and to advocate for the essential role of safe water, improved hygiene. Since 2009 our supporters have helped WaterAid and our partners to successfully deliver our previous Global Strategy: reaching over 10 million people with safe water and 13 million people with sanitation, with a focus on sustainability and reaching the poorest and most marginalised people. Our evidence-based policy and campaigns work has influenced and inspired others to reach many millions more.

Further descriptive statistics results based on the opinion of water management organizations and the government officials were presented in Table 2.

Table 2: Descriptive Statistics

Statement	SA	A	U	D	SD	Mean	SD
We find it difficult to engage local community in decision making process	3.50%	1.20%	2.40%	27.10%	65.90%	4.506	0.895
We find it difficult in conducting consultative meeting between us and the local community	1.20%	0.00%	2.40%	40.00%	56.50%	4.506	0.666
The local community finds it difficult to cope up with the policies for water supplies.	3.50%	0.00%	1.20%	36.50%	58.80%	4.471	0.839
We always get support from the local community while conducting capacity building in water supply management.	2.40%	1.20%	1.20%	41.20%	54.10%	4.435	0.794
Average						4.479	0.798

According to the results in Table 2, majority (93.00%) of the respondents disagreed with the fact that they find it difficult to engage local community in decision making process. The results show that most of the respondents disagreed with the statement even though their responses sharply

varied. In addition, majority (96.50%) of the respondents disagreed with the fact that they found it difficult in conducting consultative meeting between them and the local community in Murang'a County. However, respondent N7, Project Director of the Japan International Cooperation Agency (JICA) asserted that:

Regarding water security, the lower zone neighbouring ukambani there are insufficient water resources since most of the springs in the zone have dried up. Therefore the lower zone needs more attention and financing. However the issue of water storage should be advocated for and the need to encourage the creation of other groups that can push for water resource management in the lower zone.

Similarly, majority (95.30%) of the respondents were in disagreement with the fact that the local community was finding it difficult to cope up with the policies for water supplies which they found to have effect on management of water supply in Murang'a County. The responses imply that most of the respondents disagreed. which was inconsistent with the assertion by respondent N4 who indicated that:

We are fully focused exclusively on ensuring equitable access to safe water, sanitation and hygiene education (WASH) for the world's poorest communities and this is what we are doing in Murang'a County as well. Our other duties are to promote and secure poor people's rights and access to safe water, improved hygiene and sanitation; support governments and service providers in developing their capacity to deliver safe water, improved hygiene and sanitation, involving the community in decision making process in which they are supposed to present their suggestions for action by our team and to advocate for the essential role of safe water, improved hygiene. Since 2009 our supporters have helped WaterAid and our partners to successfully deliver our previous Global Strategy: reaching over 10 million people with safe water and 13 million people with sanitation, with a focus on sustainability and reaching the poorest and most marginalised people. Our evidence-based policy and campaigns work has influenced and inspired others to reach many millions more.

Finally, majority (95.30%) of the respondents disagreed with the statement that they always got support from the local community while conducting capacity building in water supply management, support they believed was vital in the management of water supply in Murang'a County. The results affirmed that the fact that most of the respondents were in disagreement with the statement. Respondent N5 however indicated that:

Some activities foregoing and one of the activities is tree nursery from which we are getting trees to plant in riparian areas. Secondly we are engaged in offering advice to farmers in Muranga county in public barasas, on right farming methods to use because poor farming methods contributes a lot to erosion thus pollution and surface runoff of water. Sensitizing farmers on need for contour farming to reduce flow of water towards river in the area.

Correlation analysis results revealed that decision making had a strong positive and significant association with management of water supply in Murang'a County ($r=0.765$, $P=000<.05$). The result implies that decision making influences management of water supply in Murang'a County positively.

Regression Analysis

Regression analysis was conducted with the aim of assessing the statistical influence of decision making on the management of water supply and the results presented in Table 3.

Table 3: Influence of Decision Making on Management of Water Supply

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.765 ^a	.584	.579	.35285

a. Predictors: (Constant), Decision Making

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	14.535	1	14.535	116.743	.000 ^b
1	Residual	10.333	183	.124		
	Total	24.868	184			

a. Dependent Variable: Water Supply Management

b. Predictors: (Constant), Decision Making

Regression Coefficient						
Model		Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
		B		Beta		
1	(Constant)	.999	.325		3.077	.003
	Decision Making	.812	.075	.765	10.805	.000

a. Dependent Variable: Water Supply Management

As presented in Table 3 decision making was found to be satisfactory in explaining management of water supply in Murang’a County. The R coefficient of 0.765 indicated that the decision making as the independent factor had a correlation of 76.5 percent with the dependent variable management of water supply. This was supported by coefficient of determination also known as the R square of 0.584. This means that decision making explains 58.4 percent of the variations in management of water supply in Murang’a County. The remaining 41.6 percent is determined by other factors not explained in this study.

The ANOVA results indicate that the regression model was statistically significant. Further, the results imply that decision making is a good predictor in explaining management of water supply in Murang’a County. This was supported by an F statistic of 116.743 which is greater than tabulated F-statistic which is greater than tabulated F-statistic $F(1,183) = 2.2141$ and the reported p value of $p=.000$ which was less than the conventional probability significance level of $p<.05$ implying that decision making was significant in predicting management of water supply in Murang’a County.

Results regression coefficients results reveal that decision making was positively and significantly related to Management of Water Supply ($\beta=0.812, p=.000<.05$). The gradient coefficient shows

the extent to which a unit change in the independent variable causes a change in the dependent variable which in this study is change in Management of Water Supply due to a unit change in decision making. This implies that a unit change in decision making will lead to an improvement in management of water supply by 0.812 units. These regression analysis results are in agreement with the findings of Mala and Komlan (2015) which indicated that uncertainty quantification is seen as a strategy to produce risk based assessments, and thus, to facilitate informed decision making. Rising industrial and commercial demand linked to industrialization and rising incomes for some have nourished expectations of higher quantities and better quality of water, increasing pressure for improved water management policies and implementation.

H₀: There is no relationship between decision making and management of water supply in Murang'a County, Kenya

The hypothesis was tested using linear regression and determined using p-value. The acceptance/rejection criterion was that, if the p-value is $p < .05$, then H_0 is rejected but if it is $p > .05$, then H_0 will fail to be rejected. Therefore, the null hypothesis was that there is no relationship between decision making and management of water supply in Murang'a County, Kenya. Results in Table 3 shows that the $p = .000 < .05$. This was supported by a calculated t-statistic of 10.805 which was larger than the critical t-statistic of 1.96. The null hypothesis was therefore rejected. The study adopted the alternative hypothesis that there exists a relationship between decision making and management of water supply in Murang'a County, Kenya. The hypothesis results are consistent with the findings of Kristan (2013) which indicated that, the lack of well-established processes may, ironically, provide significant opportunities for employing collaboration among researchers and decision makers to develop policies and processes that integrate data into making water management decisions and thus prompt increased attention to water demand.

CONCLUSION

Decision making in water supply management requires the delivery of accurate scientific information needed in the management. However, involvement of local stakeholders in Murang'a in matters of decision making is still a challenging affair since most of the local community members still felt they are properly involved in making decisions which have to do with the management of water supply in the county. In addition, this study concludes that, all the aspects of decision making used in this study which included; Identification of water issues, prioritization of set goals/objectives, monitoring and assessment of water projects and proposal of alternative solutions consultations on water projects to be initiated affects the management of water supply in Murang'a County to a great extent.

Correlation analysis results revealed a positive and significant association between decision making and management of water supply. This study therefore concludes that decision making is an important part in the management of water supply and as such there is need for the local stakeholders and the local communities and beneficiaries of water services in Murang'a County to be involved in decision making. The study concludes that due to the complexity of the water management system and the necessary planning in involving the stakeholders, there is a great need for intensive participation and integration of various disciplines in the decision-making process so as to achieve successful management of water supply in Murang'a County. Finally the study concludes that there exists a positive and significant relationship between decision making and management of water supply in Murang' County.

RECOMMENDATION

This study found that data management was an important variable in the management of water supply in Murang'a County. The study therefore recommends that stakeholders in the management of water in Murang'a County should strive to involve the local community and beneficiaries of water services in decision making since they need to be involved in every stage of the management of water supply in the County. The study also recommends that, the agencies and government bodies in charge of water management should be involved in the provision of knowledge necessary to meet the national water goals as efficiently as possible. The study further make the following recommendations; the governments should develop methods for conserving and augmenting the quantity of water available, the governments should perfect techniques for controlling water to minimize erosion, flood damage, and other adverse effects in the country and that the governments should develop methods for managing and controlling pollution to protect and improve the quality of the water resource.

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