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INFLUENCE OF WATER MANAGEMENT DYNAMICS ON RELIABILITY OF COMMUNITY WATER SUPPLY PROJECTS IN KAKAMEGA COUNTY, KENYA

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ABSTRACT

This study examined determinants of reliability of community water supply projects in Kakamega County, Kenya. The study was grounded on Diffusion of Innovation theory, Resource Mobilization theory and Group Behaviour theory. The study used descriptive survey design and targets 81 officials managing 27 community water supply projects supported by Kakamega County government from which census sampling technique was used been used. Primary data was collected from respondents directly using self-administered structured questionnaires (closed ended questions). A pilot study was done in an established community water supply project in Vihiga County that was not within the target population but have similar characteristics like the sample population. Content validity was used to determine validity while reliability of the research instruments was tested by the Cronbach alpha test which was a measure of internal consistency. Data collected was edited, cleaned, and coded; and then SPPS version 24 was used to analyze the data. Descriptive statistical analysis was used to summarize data using frequencies and percentages while inferential statistics was computed; that is, Pearson correlation coefficient and multiple regression analysis was computed to find out whether there was correlation and linear relationship between the independent and dependent variables. The results revealed that financial resource allocation, key stakeholder involvement, capacity building and technology adoption have significant relationship with reliability of community water supply projects in Kakamega County, Kenya. The variation in the reliability of community water supply projects in Kakamega County is significantly accounted for by these for determinants. The study therefore concluded that financial resource allocation, key stakeholder involvement, capacity building and technology adoption significantly influenced reliability of community water supply projects in Kakamega County. The study recommended that that there should be a clear financing framework that is focused to allocation and disbursement of funds for community water supply projects with clear implementation plans to achieve reliability of community water supply projects. This can be done by partnering with private sector and donor partners to supplement county government financial resources allocations, technical expertise and capacity building.

Key Word: *Financial Resource Allocation, Key Stakeholder Involvement, Capacity Building, Technology*

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INTRODUCTION

Water is connected to most development aspects on earth, thus adequate, reliable, clean, accessible, acceptable and safe drinking water supply has to be available for various users. The United Nation (UN) and other countries declared access to safe drinking water as a fundamental human right, and an essential step towards improving social-economic development (Hirvi & Whitfield, 2015). Reliable access to water was one of the main goals of Millennium Development Goals (UN-MDGs) and it is also one of the main goals of the Sustainable Development Goals (SDGs). The UN-SDG goal 6 states that "Water sustains life, but safe clean drinking water defines civilization" (Satterthwaite, 2016).

The International drinking Water supply and sanitation Decade was declared in the 1980s with the aim of ensuring every person has access to safe water, of adequate quantity and basic sanitary facilities, by 1990 (World Water Assessment Programme, 2013). Despite this, one billion people in the world today are without access to improved sources of water, and access to consistent safe drinking water not withstanding water being at the center of economic and social development; (World Bank, 2015).

In Africa, the struggle for reliable access to clean drinking water is indicative of how water scarcity leads to the stalling of social-economic development. That is reliability of water supply is an issue that touches all aspects of development including health, agriculture productivity, education and opportunities of women and children, stability and peace, as well as economic productivity. All issues are interconnected and experience much overlap, that any improvement to the reliability of water supply in Africa has the potential to solve a number of developmental barriers. That is, in many African countries, there are many cases where water is not available at the locations and times where and when it is most needed (Graham, Hirai & Kim, 2016).

Kenya is classified as a water scarce country with only 647cubic meters of renewable fresh water per capita. The same is characterized by high spatial and temporal variability and extremes of drought and floods. Degradation of water resources has placed a significant macroeconomic burden on Kenya's economy, has severely affected many Kenyans' quality of life, and is threatening long-term economic development in the country. Poor planning, water resource mismanagement and lack of technical skills have led to perennial water shortages in a country otherwise endowed with enough water resources (Kelly, Shields, Cronk, Lee &Bartram, 2018).

According to Kakamega County Government integrated development plan 2018-2022, the county relies on both surface and ground water sources for its supply. It has the following main sources of water exclusive of the boreholes and springs, Rivers: Yala, Isiukhu, Nzoia, Firatsi, Sasala, Lusumu and Kipkaren. These form the major sources of water for domestic use and irrigation.The quality of water in the county is good for domestic use however, the land use practices including increase in use of chemicals in agriculture sector as well as waste water by industries tend to pollute the water as it flows downstream.

Additionally, county water sources are not used sustainably due to the dilapidated infrastructure of the distribution system, inadequate storage, illegal water connections, wasteful water use and vandalism of the infrastructure leading to approximately 53% water losses.

That is, in spite of significant investments in Kakamega County's water supply and resource management over the past years that have come along with some improvement in the access rates, still water service levels and reliability of water supply for domestic and production use is a challenge. With regards to water resource management, the county still faces challenges in maintaining the integrity of water ecosystems using approaches that positively impact on poverty levels. Some of the institutional arrangements for water

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service delivery are in place however there is need to revise the existing ones, to be in tandem with the current devolution terms in the water sector, since unreliability of water supply systems has caused several negative impacts on the consumers and the county economic development (Kakamega County Government integrated development plan 2018-2022 report).

The main water service provider in the county is Kakamega County Water and Sewerage Company Limited (KACWASCO), which is a County Corporation. The Company supplies water to Kakamega Town, Mumias, Navakholo, Butere, Malava and Lumakanda. Currently the water company supplies approximately 78% of the consumers mainly in the peri-urban and small towns of the county. The rural areas are mainly supplied by community water supply projects, NGO's, private sector actors as well as self-supply through hand dug wells. The rural water sub-sector which relies on water for productive use is marred by low un-functionality rates due to poor management impacting on unreliability of the water supply projects and schemes, inefficient technologies and weak governance, thus heavily affecting the county's rural economic development.

Statement of the Problem

According to WHO (2016), most NGOs or development partners have initiated community water projects in Kenya's rural and urban settings with minimal success because most of these water projects fall short of reliability due to a number of community related factors. For instance, a study conducted by Samantha (2018) found that about 21 million Kenyans do not have reliable supply of water for both domestic and productive use despite established water supply companies and community water supply projects.

Kakamega County Government integrated development plan 2018-2022 report shows that most common sources of water in Kakamega county are Protected Springs (43.3%), Protected Wells (16.3%), and Piped Water schemes (12.4%), Surface Water (10.8%), Unprotected Springs (5.5%), Unprotected Wells (4.1%), Rain Water (1.3%) and Tanker Truck (0.3%). The distance to the nearest water source varies greatly by Sub-county and location, whether rural or urban. 65.1% of the households travel distances of less than 500 meters to access a water source while 31.4% of the households travel distances of between 500 meters and 1 Km to access their seemingly unreliable water points.

More so, according to Kakamega County Government Water department baseline survey report (2019), long distances to water sources negatively affect Kakamega county economic development as more time is spent looking for water at the expense of carrying out economic activities. With the county economy that is agro-based and rapidly growing industrial sector, the demand for reliable water supply of good quality and sufficient quantity is constantly rising.

Though Kakamega County government heavily supports community water supply projects, their unreliability in water supply for especially productive use has really affected non-rain fed farming and water dependent investments required to boost county economic development, thus the need to examine determinants of reliability of community water supply projects in Kakamega County, Kenya.

Research Objectives

The general objective of this study was to examine determinants of reliability of community water supply projects in Kakamega County, Kenya. The specific objectives were;

- To determine the influence of financial resource allocation on reliability of community water supply projects in Kakamega County, Kenya.
- To evaluate the influence of key stakeholder involvement on reliability of community water supply projects in Kakamega County, Kenya.
- To assess the influence of capacity building on reliability of community water supply projects in Kakamega County, Kenya.

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- To determine the influence of technology adoption on reliability of community water supply projects in Kakamega County, Kenya.

The study was guided by the following research hypotheses;

- **H_{01}:** There is no significant relationship between financial resource allocation and reliability of community water supply projects in Kakamega County, Kenya.
- **H_{02}:** There is no significant relationship between key stakeholder involvement and reliability of community water supply projects in Kakamega County, Kenya.
- **H_{03}:** There is no significant relationship between capacity building and reliability of community water supply projects in Kakamega County, Kenya.
- **H_{04}:** There is no significant relationship between technology adoption and reliability of community water supply projects in Kakamega County, Kenya.

LITERATURE REVIEW

Theoretical Review

Diffusion of Innovation theory

This theory proponed by Rogers (1983) asserts that factors which influence the diffusion of an innovation include; relative advantage (the extent to which a technology offers improvements over currently available tools), compatibility (its consistency with social practices and norms among its users), complexity (its ease of use or learning), trialability (the opportunity to try an innovation before committing to use it), and observability (the extent to which the technology's outputs and its gains are clear to see). These elements are not mutually exclusive thus unable to predict either the extent or the rate of innovation diffusion.

This theory is relevant to this study because technology adoption is pegged on compatibility, relative advantage, complexity, and trialability of local water supply, billing and communication innovations and technology transfer

Resource Mobilization theory

This theory was advanced by Buechler (1995) and stated that a core groups in a social movement organization works towards bringing money, supporters, attention of the media and donors, alliances with those in power, and refines the organizational structure. This is because social movements need resources in order to be effective because dissent and grievances alone will not generate social change. The theory emphasizes on the ability of movement's members to: acquire resources and to mobilize people towards accomplishing the movement's goals. This theory assumes that individuals are rational thus weigh the costs and benefits of movement participation and act only if benefits outweigh costs. It views social organizations as goal-oriented, but organization is more important than resource because a resource is simply a means to the end.

The theory relates to this study because community based organization need the interactions and relations between Community Based Organizations and other organizations, businesses, governments, private sector, key stakeholders from local communities and well-wishers; and for the efficiency of a community based water supply project, different types of resources are required, effective resource mobilization strategies and involvement of the local communities contributions are key issues that can help attract adequate resource allocation needed to guarantee reliability of community based water supply projects in Kakamega County.

Group Behaviour Theory

This theory was developed by Lewin (1952) and stated that people support what they help create. That is Lewin (1952) while using students to test the theory observed that students were more likely to accept ideas and change if they participated in the decision making process or helped conceive the idea in the first place. Therefore Lewin (1952) linked the theory in community related researches in the sense that successful undertaking of any community work should involve all people in

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community initiatives from the start so as to own the initiative and take pride in its success.

Therefore group behavior theory connects to this study in the sense if possibly key stakeholders from the community are involved in community based water supply project initiatives, they could fully take part in their initiation, implementation and maintenance; thus community members will participate freely, get seriously involved in capacity building and can actively get involved in resource mobilization to ensure the reliability and sustainability of 'their own' community water supply project.

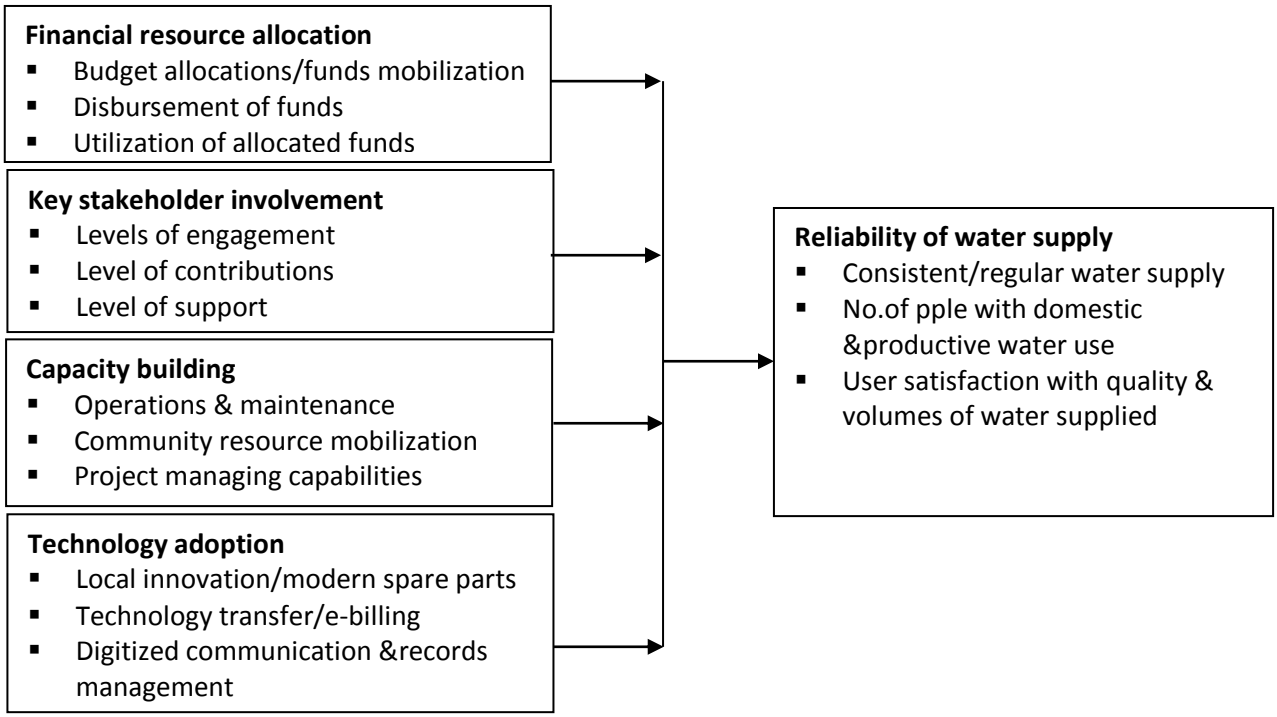

Figure 1: Conceptual framework
Source: Researcher (2020)

Empirical Review

Dollins (2016) study reiterated that financial resources are probably the most sought-after local contribution, as they provide the ability to purchase a variety of goods and services that may not be otherwise available. Depending on the source, financial resources may be targeted to specific expenses or be used at the NGO or CBO's discretion. Financial resources can thus be raised from local citizens, businesses, local authorities, or others in a variety of forms and through many means, including: donations of cash grants and allocations from local authorities or other community organizations.

In a study by Mungolia (2019) the local governments can be a valuable source of financial and non-financial support for community water project activities. In addition to direct funding of local community water projects, NGOs work with local governments to receive free office and activity space, coverage of their utility bills, technical and expert advice, support in obtaining permits for reconstruction projects, and use of vehicles and equipment to ensure sustainability and reliability of community water projects.

Diy, 2015) study showed that most rural communities, water is scarce and therefore not all people live next to water sources creating a need to bring the water closer to their places of habitation. This leads to formation of community water projects since individuals cannot afford. Successful performance is so much dependent on involvement

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of communities from initiation, through implementation to project closure. Engaging them will ensure that the project responds to local needs utilizing local resources. This will also help understand the community context which will help determine the characteristics of the community and work out where organizers interests intersect with the needs of the local community.

Arku (2011) study in Ghana showed that reliable supply of clean water in rural communities enabled women directly and men indirectly save a considerable amount of time which they used in activities that supported their subjective well-being indicators. In the planning and designing of water projects it is important to ensure the needs and interest of both men and women. However, the study also revealed that women are largely excluded from local management of water projects. That is, Ghana was one of the first countries to introduce community-based approach to rural water supply on a large scale, which is in line with current drinking water policies in many countries. This approach involves the formation of key local teams to plan, implement and manage the community water projects, and is significantly cheaper than those provided by government departments.

In Kenya, Mutonga (2015) while studying on factors influencing reliability of donor funded community water projects: a case of Kitui central constituency, Kitui County, Kenya found that most of the community members were not involved in the implementation of the community projects in all the phases and that there was a strong positive correlation between community participation and sustainability of donor funded community projects. Secondly, community capacity building was not fully undertaken prior to the implementation of the water projects and as a result the community lacked appropriate skills for management, lacked information of policy guidelines on the management of water projects and there was poor planning by the management team thus recommended training of community leaders on the management of community water projects from the planning stage, implementation and subsequent running of management of the project so as to make it sustainable.

More so, Kipkeny (2014) while examining on factors affecting sustainability of hand pump operated shallow wells in Garissa Sub-County found that trained artisans are not available as was reported by 77.04% of respondents. That is, hand pump operated shallow wells can be effectively and efficiently managed by the community established structures with increased functionality and sustainability with adequate capacity building of community institutions, technical support and effective financial management with minimal external supported from the government and other external actors. The researcher the need to strengthen the capacity of the management committees through training on management, operation and maintenance of the shallow wells and established effective networks and supply chains for the spare parts so to ensure reliable water supply to community members.

Indiatimes (2016) reviewed empirical studies on technological innovations and community based water projects in rural areas in India and reiterated that areas that significantly relied in technological innovations included use of locally assembled water pumps, spare parts innovations, operations and maintenance of water supply systems.

Fielmua (2011) surveys in Tanzania found that only 46% of existing rural water points were functional, and a quarter of the newly installed systems fail after only two years of operation. This problem of lack of reliability of rural water points was associated with lack of finance especially for operation and maintenance, lack of technical personnel at the project level, and lack of spare parts.

METHODOLOGY

This study adopted the descriptive survey design. For this study, the target population was the management team chosen from the community

(chairperson, secretary, treasurer) of each of the 27 community water supply projects supported by Kakamega County Government's Department of Water, Environment and Natural Resources. Each of the water community supply projects are managed by committee members selected among the community. A total of 81 respondents were used as the sample size using census sampling technique. Primary data was collected from respondents directly using self-administered structured questionnaires (closed ended questions). Data collected was edited, cleaned, and coded; and then SPPS version 24 was used to analyze the data. Descriptive statistical analysis was used to summarize data using frequencies and percentages while inferential statistics was computed; that is, Pearson correlation coefficient and multiple regression analysis was computed to find out whether there is correlation and linear relationship between the independent and dependent variables. The following multiple regression equation was applied;

$$Y=\alpha + \beta_1X_1 + \beta_2X_2+\beta_3X_3+\beta_4X_4+\varepsilon$$

Where γ= Dependent variable [Reliability of water supply]

α=Constant; the y intercept or the average response when independent variables are 0

X_1= Independent variable 1 [Financial resource allocation]

X_2= Independent variable 2 [Key stakeholder involvement]

X_3= Independent variable 3 [Capacity building]

X_4= Independent variable 4 [Technology adoption]

ε= error term

$\beta_{1....}$ B_4 = Beta Coefficients

FINDINGS

Descriptive Statistics

The study sought the respondents' views on financial resource allocation, key stakeholder involvement, capacity building, technology adoption and reliability of community water supply projects. Descriptive analysis for this section used percentages, frequencies, means and standard deviation to show the response from the respondents as shown in the tables below for each variable. The respondents were required to state their level of agreement on various statements on each variable. The level of agreement ranged from 1-strongly disagree, 2-disagree, 3-Nuetral, 4-agree and 5- strongly agree. The results were as follows.

Financial Resource Allocation

The sampled respondents were provided with six statements related to financial resource allocation as per first objective of the study. Percentages are in parenthesis (%) while SDV is the standard deviation. The results are as presented in Table 1.

Table 1: Financial Resource Allocation

Statements	5	4	3	2	1	Mean	SDV
There is adequate budget allocation from the county government to run water supply costs	2 (3)	22 (33.3)	21 (31.8)	17 (25.8)	4 (6.1)	3.015	.9844
Allocated funds from the county government are timely disbursed	3 (4.5)	30 (45.5)	24 (36.4)	6 (9.1)	3 (4.5)	3.364	.8882
There are diverse funds mobilization initiatives to run community water projects	12 (18.2)	22 (33.3)	21 (31.8)	7 (10.6)	4 (6.1)	3.470	1.0985
Allocated funds from the county government are adequately utilized by community water project management team	21 (31.8)	15 (22.7)	22 (33.3)	5 (7.6)	3 (4.5)	3.697	1.1364

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There is adequate financial support from the county government to meet basic costs of operating and repairing water supply facilities	5 (7.6)	26 (39.4)	19 (28.8)	12 (18.2)	4 (6.1)	3.242	1.038 6
There is sufficient funding from private partners to boost maintenance of community water supply projects	8 (12.1)	28 (42.4)	17 (25.8)	10 (15.2)	3 (4.5)	3.424	1.038 6
Average						**3.369**	

From Table 1, 33.3% of the respondents agreed that there is adequate budget allocation from the county government to run water supply costs while 3.0% strongly agreed. On the other, 31.8% were undecided and 25.8% disagreed on the same. A mean of 3.02 postulated that there is inadequate budget allocation from the county government to run water supply costs. Similarly, slight majority of the respondents (45.5%) agreed that allocated funds from the county government are timely disbursed and further 4.5% strongly agreed although 36.4% were undecided on the same. A mean of 3.36 indicated that allocated funds from the county government are timely disbursed.

The results also revealed that 33.3% and 18.2% of the respondents agreed and strongly agreed respectively that there are diverse funds mobilization initiatives to run community water projects. However, 31.8% of the respondents were neutral that there are diverse funds mobilization initiatives to run community water projects. Slight majority of the respondents (31.8%) strongly agreed that allocated funds from the county government are adequately utilized by community water project management team and 22.7% of them agreed. However, with standard deviation of 1.14, some of the respondents were not sure whether allocated funds from the county government are adequately utilized by community water project management team which is further supported by 33.3% of the respondents.

The results further revealed that 39.4% of the respondents agreed that there is adequate financial support from the county government to meet basic costs of operating and repairing water supply facilities and 7.6% strongly agreed on the same. However, slight majority of the respondents were neutral on whether there is adequate financial support from the county government to meet basic costs of operating and repairing water supply facilities as shown by 28.8% of the respondents.

Lastly, the results revealed that 42.3% and 12.1% of the sampled respondents agreed and strongly agreed that there is sufficient funding from private partners to boost maintenance of community water supply projects. However, 25.8% of the respondents were neutral that there is sufficient funding from private partners to boost maintenance of community water supply projects. These findings are in agreement with Mungolia (2019) who reiterated that the local governments can be a valuable source of financial and non-financial support for community water project activities. Dollins (2016) also reiterated that financial resources are probably the most sought-after local contribution, as they provide the ability to purchase a variety of goods and services that may not be otherwise available.

Key Stakeholder Involvement

The sampled respondents were provided with six statements related to key stakeholder involvement as per second study objective. The pertinent results were as shown in Table 2.

Table 2: Key stakeholder involvement

Statements	5	4	3	2	1	Mean	SDV
There is a transparent process for selection of key strategic collaborators to assist management of community water supply projects	15 (22.7)	34 (51.5)	10 (15.2)	5 (7.6)	2 (3)	3.833	.9701
Conflict resolution in the management of community water supply projects is based on communal agreement	15 (22.7)	37 (56.1)	11 (16.7)	1 (1.5)	2 (3)	3.939	.8572
There exists a unit that ensures bonding with key collaborators to enhance efficient water supply	20 (30.3)	20 (30.3)	21 (31.8)	2 (3)	3 (4.5)	3.788	1.060
All relevant teams are trained jointly to build consensus between water service providers and key opinion leaders from the local community	10 (15.2)	29 (43.9)	20 (30.3)	5 (7.6)	2 (3)	3.606	0.942
Water supply issues are evaluated and solved in a collaborative manner by key stakeholders	10 (15.2)	20 (30.3)	32 (48.5)	3 (4.5)	1 (1.5)	3.530	0.863
Key stakeholders are frequently engaged in the running of community water projects	14 (21.2)	23 (34.8)	22 (33.3)	6 (9.1)	1 (1.5)	3.652	.9686
Average						**3.725**	

The results in Table 2, 51.5% of the respondents agreed there is a transparent process for selection of key strategic collaborators to assist management of community water supply projects while 22.7% agreed on the same. A mean of 3.83 indicated that there is a transparent process for selection of key strategic collaborators to assist management of community water supply projects. The results further revealed that 56.1% and 22.7% of the respondents agreed and strongly agreed that conflict resolution in the management of community water supply projects is based on communal agreement. However, 16.7% of the respondents were not sure whether conflict resolution in the management of community water supply projects is based on communal agreement.

The results also revealed that 30.3% of the respondents agreed that there exists a unit that ensures bonding with key collaborators to enhance efficient water supply while 30.3% strongly agreed on the same. However, 31.8% of the respondents were not sure whether there exists a unit that ensures bonding with key collaborators to enhance efficient water supply. The results further revealed that 15.2% and 43.9% of the respondents strongly agreed and agreed respectively that all relevant teams are trained jointly to build consensus between water service providers and key opinion leaders from the local community. A mean of 3.61 indicated that all relevant teams are trained jointly to build consensus between water service providers and key opinion leaders from the local community.

The results also revealed that 30.3% of the respondents agreed that water supply issues are evaluated and solved in a collaborative manner by key stakeholders and further 15.2% of the respondents strongly agreed. However, 48.5% of the respondents were undecided that water supply issues are evaluated and solved in a collaborative manner by key stakeholders with a mean of 3.53. Lastly, slight majority of the respondents confirmed that key stakeholders are frequently engaged in the running of community water projects as indicated by 21.2% who strongly agreed and 34.8% who agreed although 33.3% of the respondents were undecided on the same. These results concur with Ayuso et al. (2015) who indicated that stakeholder participation in community projects asserted that when communities are involved in project initiation and implementation, there is the assurance of

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sustainability subject to some conditions unlike when they have no idea about the project or when it is imposed on them. Pretty (2016) reviewed studies on water supply projects in Kenya and reiterated the need for involving key stakeholders from local communities for material incentive. This is where People participate by providing resources, for example labour, in return for food, cash or other material incentives.

Capacity Building

The sampled respondents were provided with six statements related capacity building the third study objective. The relevant results were as shown in Table 3.

Table 3: Capacity Building

Statements	5	4	3	2	1	Mean	SDV
There are project planning & management workshops to assist in the running of community water supply projects	14 (21.2)	37 (56.1)	10 (15.2)	2 (3)	3 (4.5)	3.864	.9428
The supportive staff members are taught about operations and maintenance of community water supply projects	13 (19.7)	25 (37.9)	24 (36.4)	2 (3)	2 (3)	3.682	.9308
Local opinion leaders are engaged in community resource mobilization capabilities	13 (19.7)	29 (43.9)	17 (25.8)	3 (4.5)	4 (6.1)	3.667	1.042
Training in networking/advocacy/consensus building skills aid in the management of community water supply projects	11 (16.7)	27 (40.9)	19 (28.8)	5 (7.6)	4 (6.1)	3.545	1.055
There is regular technical training to improve operations and maintenance of community water supply projects	11 (16.7)	17 (25.8)	26 (39.4)	11 (16.7)	1 (1.5)	3.394	1.005
Generally, capacity building initiatives helps improve reliable supply of water from community water supply projects	7 (10.6)	37 (56.1)	15 (22.7)	5 (7.6)	2 (3)	3.636	0.888
Average						3.631	

From Table 3, the results revealed that 56.1% of the sampled respondents agreed that there are project planning & management workshops to assist in the running of community water supply projects and 21.2% strongly agreed on the same. A mean of 3.86 implied that there are project planning & management workshops to assist in the running of community water supply projects. On the other hand, 37.9% of the sampled respondents agreed that the supportive staff members are taught about operations and maintenance of community water supply projects and 24.7% strongly agreed on the same. However, 36.4% of the respondents were undecided that the supportive staff members are taught about operations and maintenance of community water supply projects

The results further revealed that 43.9% and 19.7% of the respondents agreed and strongly agreed respectively that local opinion leaders are engaged in community resource mobilization capabilities although 25.8% were undecided on the same. A mean of 3.667 revealed that local opinion leaders are engaged in community resource mobilization capabilities. In addition, 40.9% and 16.7% of the sampled respondents agreed and strongly agree that training in networking/advocacy/consensus building skills aid in the management of community water supply projects. This was also supported by a mean of 3.63.

In regards to regular training, 25.8% of the respondents agreed that there is regular technical training to improve operations and maintenance of community water supply projects and 16.7% strongly agreed on the same. However, 39.4% of the respondents were undecided whether there is regular technical training to improve operations and

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maintenance of community water supply projects. Lastly, 56.1% and 10.6% of the sampled respondents agreed and strongly agreed that generally, capacity building initiatives helps improve reliable supply of water from community water supply projects. On the hand, 22.7% of the respondents were undecided and 7.6% disagreed that generally, capacity building initiatives helps improve reliable supply of water from community water supply projects. The results were also supported by a mean of 3.39.

These findings are in agreement with Kitur (2015) indicated that sustainability of water resource projects by women in Sotik Sub-County, Bomet County, Kenya and noted that good leadership through capacity building influence sustainability of water projects. However, Mutonga (2015) while studying on factors influencing reliability of donor funded community water projects: a case of Kitui central constituency, Kitui County, Kenya found community capacity building was not fully undertaken prior to the implementation of the water projects and as a result the community lacked appropriate skills for management, lacked information of policy guidelines on the management of water projects.

Technology adoption

The sampled respondents were provided with six statements related technology adoption and reliability of community water supply projects in regard to objective four of the study. The relevant results were as shown in Table 4.

Table 4: Technology adoption

Statements	1	2	3	4	5	Mean	SDV
There are local innovations to assist in operations and maintenance of community water systems	17 (25.8)	24 (36.4)	10 (15.2)	14 (21.2)	1 (1.5)	3.636	1.131
Solar pumping systems have been installed as a water pumping back up in case of power blackouts	12 (18.2)	30 (45.5)	18 (27.3)	2 (3)	4 (6.1)	3.667	1.012
Local supportive staff members participate in technology transfer training to understand operations and maintenance of community water supply systems	14 (21.2)	31 (47)	11 (16.7)	7 (10.6)	3 (4.5)	3.697	1.066
There is an operationalized e-billing system to harmonize water consumption quantity and bills	10 (15.2)	16 (24.2)	14 (21.2)	23 (34.8)	3 (4.5)	3.106	1.178
There is an operational online complaints management system to address water supply issues	8 (12.1)	37 (56.1)	18 (27.3)	2 (3)	1 (1.5)	3.742	0.770
There is digitized communication and electronic records management systems	11 (16.7)	24 (36.4)	27 (40.9)	2 (3)	2 (3)	3.606	.9094
Average						**3.576**	

From Table 4, 36.4% of the respondents agreed that there are local innovations to assist in operations and maintenance of community water systems while 25.8% strongly agreed with a mean of 3.63 and standard deviation of 1.13. The results also revealed that 45.5% and 18.2% of the respondents agreed and strongly agreed respectively that solar pumping systems have been installed as a water pumping back up in case of power blackouts. A mean of 3.667 revealed that solar pumping systems have been installed as a water pumping back up in case of power blackouts.

Few of the respondents agreed that local supportive staff members participate in technology transfer training to understand operations and maintenance of community water supply systems

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as shown by 24.2%. Similarly, 15.2% of the respondents strongly agreed on the same although 34.8% of the respondents disagreed with a mean of 3.106. The results also revealed that 47.0% of the respondents agreed that there is an operationalized e-billing system to harmonize water consumption quantity and bills. Only 4.5% of the respondents strongly disagreed and further 10.6% disagreed with a mean of 3.70.

The results also revealed that 56.1% of the respondents agreed that there is an operational online complaints management system to address water supply issues and 12.1% strongly agreed on the same. However, 27.3% of the respondents were undecided with a mean of 3.74. Lastly, few of the respondents (36.4%) agreed that there is digitized communication and electronic records management systems while 16.7% strongly agreed on the same. However, slight majority of the respondents were undecided whether there is digitized communication and electronic records management systems as indicated by 40.9% of the sampled respondents.

The results obtained are in agreement with Indiatimes (2016) who revealed that technological innovations and community based water projects in rural areas in India and reiterated that areas that significantly relied in technological innovations included use of locally assembled water pumps, spare parts innovations, operations and maintenance of water supply systems. Aharikundira (2015 indicated that current technological advancements were identified as key in enhancing water supply operations.

Reliability of Community Water Supply Projects

The sampled respondents were provided with six statements related to reliability of community water supply projects. The relevant results were as shown in Table 5.

Table 5: Reliability of Community Water Supply Projects

Statements	5	4	3	2	1	Mean	SDV
There is consistency in water service provision by the local community supply project	13 (19.7)	24 (36.4)	14 (21.2)	11 (16.7)	4 (6.1)	3.470	1.16
Most of local community members regularly rely on the local community water supply project for domestic use	11 (16.7)	21 (31.8)	16 (24.2)	17 (25.8)	1 (1.5)	3.364	1.09
Most of local farmers regularly rely on the local community water supply project for productive use	12 (18.2)	31 (47)	5 (7.6)	13 (19.7)	5 (7.6)	3.485	1.21
Local farmers who rely on the local community water supply project for productive use rarely complain from water supply problems	12 (18.2)	27 (40.9)	6 (9.1)	14 (21.2)	7 (10. 6)	3.348	1.29
People who rely on local community water supply project are satisfied with regular water provision	6 (9.1)	35 (53)	9 (13.6)	15 (22.7)	1 (1.5)	3.455	0.99
Generally, the local community members are satisfied with the quality and volumes of water supplied by the local community water supply project	6 (9.1)	38 (57.6)	12 (18.2)	6 (9.1)	4 (6.1)	3.545	.995
Average						**3.445**	

From Table 5, small majority of the sampled respondents (36.4%) agreed that there is consistency in water service provision by the local community supply project. This was further supported by 19.7% of the respondents who strongly agreed. However, 21.2% of the

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respondents were undecided and 16.7% disagreed that there is consistency in water service provision by the local community supply project.

The results also revealed that 31.8% agreed that most of local community members regularly rely on the local community water supply project for domestic use and additional 16.7% strongly agreed on the same. However, 25.8% strongly disagreed and 24.2% disagreed that most of local community members regularly rely on the local community water supply project for domestic use.

Slight majority of the respondents confirmed that most of local farmers regularly rely on the local community water supply project for productive use.as shown by 47.0% and 18.2% who agreed and strongly agreed respectively. On the other hand, 19.7% of the respondents disagreed with a mean of 3.48.

Small majority of the respondents agreed that local farmers who rely on the local community water supply project for productive use rarely complain from water supply problems as shown by 40.9% while 18.2% strongly agreed on the same. However, 21.1% of the respondents strongly disagreed that local farmers who rely on the local community water supply project for productive use rarely complain from water supply problems. The results further revealed that 53.0% of the respondents agreed that people who rely on local community water supply project are satisfied with regular water provision and 9.1% strongly agreed. On the hand, 13.6% were undecided whole 22.7% disagreed with a mean 3.45.

Lastly, 57.6% and 9.1% of the respondents agreed and strongly agreed respectively that generally, the local community members are satisfied with the quality and volumes of water supplied by the local community water supply project. However, 18.2% of the respondents were undecided and 9.1% y disagreed that generally, the local community members are satisfied with the quality and volumes of water supplied by the local community water supply project.

Inferential Analysis

Linear Regression

The collected categorical data was first summated and transformed into continuous data using SPSS to allow running of correlations, linear and multiple regressions analyses.

Secondly, normality test asserts that data must have a normal distribution and this was tested by the use histograms with normal curve. The results showed histograms with bell-shaped normal curves indicating that data was approximately normally distributed, thus met this assumption.

Thirdly, test of linearity refers to the degree to which the change in the dependent variable is related to the change in the independent variable. This was tested by correlation coefficients and correlation results showed that all of the study's independent variables (financial resources allocation, key stakeholder involvement, capacity building and ICT adoption) have significant correlation with the dependent variable reliability of community water supply projects) as shown in the table.

Secondly, multicollinearity tests whether two or more conceptualized independent variables are highly correlated with each other. This leads to problems with understanding which independent variable contributes to the variance explained in the dependent variable, as well as statistical problems in calculating a multiple regression model. This assumption was tested using correlation analysis. Most researchers insist that if correlation coefficient, (r) is close to 1 or -1, then there is multicollinearity but if correlation coefficient (r) is not above 0.9, then there is no multicollinearity In this study (correlation analysis), the highest correlation coefficient between all pairs of independent variables (financial resources allocation, key stakeholder involvement, capacity building and ICT adoption) is 0.634, which is below the threshold of 0.9, thus multicollinearity assumption was checked and met.

Table 6: Correlations

		FRA	KSI	CB	TA
FRA-Financial resource allocation	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	66			
KSI-Key stakeholder involvement	Pearson Correlation	.576**	1		
	Sig. (2-tailed)	.000			
	N	66	66		
CB-Capacity building	Pearson Correlation	.375**	.605**	1	
	Sig. (2-tailed)	.002	.000		
	N	66	66	66	
TA-Technology adoption	Pearson Correlation	.404**	.562**	.634**	1
	Sig. (2-tailed)	.001	.000	.000	
	N	66	66	66	66
Reliability of community water supply projects	Pearson Correlation	.545**	.660**	.636**	.625**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	66	66	66	66

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

Multiple Linear Regression: Determinants and Reliability of community water supply projects

The study sought to find out the effect of the combined determinants namely, financial resource allocation, Key stakeholder involvement, Capacity building and technology adoption on reliability of community water supply projects in Kakamega County, Kenya. To accomplish this, Multiple Regression Analysis test was used.

Table 7: Multiple Linear Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.768[a]	.590	.564	.451424	.590	21.985	4	61	.000

a. Predictors: (Constant), Technology adoption, Financial resource allocation, Key stakeholder involvement, Capacity building

b. Dependent Variable: Reliability of community water supply projects

From the table 7, the findings showed that r squared = .590 which indicated that 59.0% of variations of reliability of community water supply projects was caused by four selected determinants, while 41.0% variations of reliability of community water supply projects was caused by other unexplained factors because the study addressed four determinants and reliability of community water supply projects in Kakamega County, Kenya. From the findings, the results showed that F = 21.985and P = 0.000 which indicated that the four determinants had statistical significant effect on reliability of community water supply projects in Kakamega County, Kenya.

The study also sought to find out the regression coefficient between determinants and reliability of community water supply projects in Kakamega County, Kenya and the results are presented in Table 8.

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Table 8: Regression Coefficients; Determinants and Reliability of community water supply projects

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.471	.452		-1.044	.301
Financial resource allocation	.245	.119	.207	2.051	.045
Key stakeholder involvement	.289	.136	.253	2.120	.038
Capacity building	.238	.108	.254	2.209	.031
Technology adoption	.319	.149	.239	2.141	.036

a. Dependent Variable: Reliability of community water supply projects

From the table, the results showed that financial resource allocation practices had regression coefficient B =0.245 which indicated that a change in financial resource allocation by one unit was associated with an increase of 0.245 units of reliability of community water supply projects. These results were in agreement with Turner (2014) who investigated financial resource allocations on community projects asserts that finance resource availability is always at the core of any successful community project undertaking and its integral activities.

Key stakeholder involvement practices had B = 0.289 which indicated that a change in key stakeholder involvement by one unit was associated with an increase of 0.289 units of reliability of community water supply projects. These findings are in agreement with Katz and Sara (2017) while analyzing reliability of water systems in six countries in Benin, Bolivia, Honduras, Indonesia, Pakistan, and Uganda found that the community-based approach using key stakeholders significantly increased reliability of water systems.

Capacity building practices had regression coefficient B = 0.238 which indicated that a unit change in Capacity building was associated with an increase in 0.238 units of reliability of community water supply projects. The results conform to Kitur (2015) who studied on sustainability of water resource projects by women in Sotik Sub-County, Bomet County, Kenya and noted that good leadership through capacity building influence sustainability of water projects.

Technology adoption had regression coefficient B = 0.319 which indicated that a unit change in technology adoption practice was associated with an increase in 0.319 units of reliability of community water supply projects. The results mirrored Lencha (2015) who studied rural water supply management and sustainability in Ethiopia, Adama area and concluded that technical know-how and development are important in critical to achieve sustainability within systems.

Therefore, the study concluded that financial resource allocation, key stakeholder involvement, ICT adoption and capacity building had statistical significant positive effect on reliability of community water supply projects. Based on the beta coefficient results, the equation of Multiple Linear Regression model was written as,

Regression equation without moderator

$Y = -0.471 + 0.245X_1 + 0.289X_2 + 0.238X_3 + 0.319X_3$

Where;

Y = Reliability of community water supply projects (Dependent variable)

X_1 = Financial Resource Allocation

X_2 = Key stakeholder involvement

X_3 = Capacity building

X_4 = ICT Adoption

Hypothesis Testing

First, study hypothesis one (H_{01}) stated that there is no significant relationship between financial resource allocation and reliability of community water supply projects in Kakamega County, Kenya. Multiple regression results indicate that financial resource allocation has significant influence on reliability of community water supply projects in

Kakamega County, Kenya (β = 0.245 (P=0.045) at *p<0.05*). Hypothesis one was therefore rejected. The results indicate that a single improvement in transparent practices will lead to 0.245 unit improvement in reliability of community water supply projects in Kakamega County, Kenya.

Secondly, study hypothesis two (H_{02}) stated that there is no significant relationship between key stakeholder involvement and reliability of community water supply projects in Kakamega County, Kenya. Multiple regression results indicate that key stakeholder involvement has significant influence on reliability of community water supply projects in Kakamega County, Kenya (β = 0.289 (P=0.038) at *p<0.05*). Hypothesis two was therefore rejected. The results indicate that a single improvement in key stakeholder involvement will lead to 0.289 unit improvement in reliability of community water supply projects in Kakamega County, Kenya.

Thirdly, study hypothesis three (H_{03}) stated there is no significant relationship between capacity building and reliability of community water supply projects in Kakamega County, Kenya. Multiple regression results indicate that capacity building has significant influence on reliability of community water supply projects in Kakamega County, Kenya (β = 0.238 (P=0.031) at *p<0.05*). Hypothesis three was therefore rejected. The results indicate that a single improvement in capacity building will lead to 0.238 unit improvement in reliability of community water supply projects in Kakamega County, Kenya.

Fourthly, study hypothesis four (H_{04}) stated that there is no significant relationship between technology adoption and reliability of community water supply projects in Kakamega County, Kenya. Multiple regression results indicate that technology adoption practice has significant influence on reliability of community water supply projects in Kakamega County, Kenya (β = 0.319 (P=0.036) at *p<0.01*). Hypothesis four was therefore rejected. The results indicate that a single improvement in technology adoption will lead to 0.319 unit improvement in reliability of community water supply projects in Kakamega County, Kenya.

CONCLUSIONS AND RECOMMENDATIONS

The study established that there is significant relationship between financial resource allocation and reliability of community water supply projects in Kakamega County, Kenya. This suggested that an increase in financial resource allocation such as adequate budgetary allocation, diverse funds mobilization initiatives and sufficient funding from private partners would results to increase in reliability of community water supply projects in Kakamega County, Kenya. The study therefore, concluded that financial resource allocation significantly influenced reliability of community water supply projects in Kakamega County, Kenya.

The study also established that there is significant relationship between key stakeholder involvement and reliability of community water supply projects in Kakamega County, Kenya. This is an indication that an increase in key stakeholder involvement such as transparent process for selection of key strategic collaborators, Conflict resolution in the management of community water supply projects and Key stakeholders frequently engaged would results to increase in reliability of community water supply projects in Kakamega County. The study therefore, concluded that key stakeholder involvement significantly influenced reliability of community water supply projects in Kakamega County, Kenya.

The results revealed that reliability of community water supply projects in Kakamega County is significantly related to capacity building. This is an indication that an increase in capacity building such as project planning & management workshops, supportive staff members are taught about operations and maintenance of community water supply projects and regular technical training to improve operations and maintenance of community water supply projects would improve reliability of community water supply projects in Kakamega

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County. The study therefore, concluded that capacity building significantly influenced reliability of community water supply projects in Kakamega County, Kenya.

Finally, the results revealed that reliability of community water supply projects in Kakamega County is significantly related to ICT adoption. This suggested that local innovations to assist in operations and maintenance of community water systems, operational online complaints management system to address water supply issues would improve reliability of community water supply projects in Kakamega County. The study therefore, concluded that ICT adoption significantly influenced reliability of community water supply projects in Kakamega County, Kenya.

Based on the study findings and conclusions arrived at, the following recommendations are suggested.
The study concluded that financial resource allocation significantly influenced reliability of community water supply projects in Kakamega County, Kenya. The study recommends that there should be a clear financing framework that is focused to allocation and disbursement of funds for community water supply projects with clear implementation plans to achieve reliability of community water supply projects. This can be done by partnering with private sector and donor partners to supplement county government financial resources allocations.

The study concluded that key stakeholder involvement significantly influenced reliability of community water supply projects in Kakamega County, Kenya. Therefore, the study recommends a holistic involvement of all key stakeholders in community water supply projects in a transparent process that is acceptable by all users. This will demand responsive approaches that include key principles such as the recognition of key stakeholder from sub county, ward and village level. This would enhance conflict resolution in the management of community water supply projects is based on communal agreement and sustainability of community water projects.

The study concluded that capacity building significantly influenced reliability of community water supply projects in Kakamega County, Kenya. The study recommended that the County Government of Kakamega should upscale capacity building programme related to the management of community water supply projects through frequent training in networking/advocacy/consensus building skills aid in the management of community water supply projects and engaging local leaders to harness their community resource mobilization capabilities.

Lastly, the study concluded that ICT adoption significantly influenced reliability of community water supply projects in Kakamega County, Kenya. The study recommended that County Governments should continuously invest in technology so that management of community water supply projects are technology based. This can be achieved by investing in green energy such as solar, using e-billing system and online user support services. This would increase efficiency of service delivery (water reliability), cost saving and integrity of community water supply projects.

Areas for further Research

This study examined determinants of reliability of community water supply projects in Kakamega County, Kenya. Four determinants were financial resources allocation, key stakeholder involvement, capacity building and technology adoption. The study suggested that there is need to examine other determinants such as technical expertise and political influence.

The study did not use a third variables such as intervening, moderating or mediating variable which may have influence the relationship between determinants and reliability of community water supply projects. Further studies should focus on regulatory frameworks and policies in water sector which may have influence reliability of community water supply projects in Kakamega County, Kenya.

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REFERENCES

Adams, J., Khan, H. ., Raeside, R., & White, D. (2007).*Research Methods for Graduate business and social science students. New Delhi: SAGE Publications India Pvt Ltd*.

Aharikundira, D (2015). Sector Assistance Program Evaluation on Urban Services and Water Supply and Sanitation Sector in Viet Nam: Asian Development Bank.

AfDB (2014).Rural Water Supply and Sanitation. Administering contingent valuation surveys in developing Countries. *World Development 26(1):32–40*

Akumu, P.O., (2011), Role of the Local Communities Participation in Resource Mobilization in Busia District Western Kenya. *International Journal of Social Sciences: 6(2): 92-99.*

Allouche, A P (2014). Role of the Local Communities Participation in Resource Mobilization in Busia District Western Kenya. *International Journal of Social Sciences: 6(2):92-99.*

Arku, F.S (2011) Dilemma of engaging community-wide in development: Has Konko's (Eastern Region, Ghana) water and sanitation committee taken over decision making at the community's will? *Int. NGO J. 6(9):203-210*

Ayuso, S.; Rodríguez, M.A.; Castro, R.G.; Ariño, M.A (2015). Does stakeholder engagement promote sustainable innovation orientation? *Ind. Manag. Data. Syst*., *123*.

Babbie, E. (2002). The basics of social research. Belmont: CA: Wadsworth Publishing.

Baiya, F, M (2005) Planning, monitoring and Evaluation framework. KAPP Inc.

Barlow, M., & Clarke, T. (2017). *Blue gold: the battle against corporate theft of the world's water*. Routledge.

Behrens, P., van Vliet, M. T., Nanninga, T., Walsh, B., & Rodrigues, J. F. (2017). Climate change and the vulnerability of electricity generation to water stress in the European Union. *Nature Energy*, *2*(8), 17114.

Bellaubi, F., & Visscherb, J. T. (2016). Key stakeholder involvement and corruption risks in water service delivery in Kenya and Ghana. *International Journal of Water*, *4*, 11.

Buechler SM (2009). Beyond Resource Mobilization? Emerging Trends in Social Movement Theory. *The Sociological Quarterly, 34(2), 217–235.*

Burke, R. (2013). *Project management: planning and control techniques*. New Jersey, USA.

Cole G (2009). Personnel and Human Resource Management (5th Edition), Biddles Ltd, International HIV/AIDS work (A total kit support NGO's and CBO's)

Cook, J., Kimuyu, P., & Whittington, D. (2016). The costs of coping with poor water supply in rural Kenya. *Water Resources Research*, *52*(2), 841-859.

Cooper, D., & Schindler, P. (2014). Business Research methods (12th ed.). McGraw-Hill/Irwin, a business unit of The McGraw-Hill Companies.

Dadson, S., Hall, J. W., Garrick, D., Sadoff, C., Grey, D., & Whittington, D. (2017). Water security, risk, and economic growth: Insights from a dynamical systems model. *Water Resources Research*, *53*(8), 6754-5978.

Diy, A (2015). *A Guide to Engaging the Community in Your Project.* Toronto: Artscape DIY.

Dollins, A (2016). *People Raising: A Practical Guide to Raising Support*, Moody Press, Chicago.

Dillon, A., & Morris, M. (1996). User acceptance of new information technology: theories and models. A*nnual Review of Information Science and Technology, Medford(NJ), 31*, 3-32.

Fielmua, N 2011). The role of the community ownership and management strategy. *The Sociological Quarterly 39.*

Ghaffour,N Missimer, T and Amy, G (2015). Technical review and evaluation of economics of water desalination: current and future challenges for better water supply sustainability. *Desalination*, *309*, 197-207.

Graham, J. P., Hirai, M., & Kim, S. S. (2016). An analysis of water collection labor among women and children in 24 sub-Saharan African countries. *PloS one*, *11*(6).

Hair, J. F, Black, W, C, Babin, B. J, & Anderson, R. E. (2006). Multivariate data analysis. 7th edition Prentice Hall NY.

Hirvi, M., & Whitfield, L. (2015). Public-service provision in clientelist political settlements: Lessons from Ghana's urban water sector. *Development Policy Review*, *33*(2), 135-289.

Indiatimes (2016). Lessons for Rural Water Supply. Assessing progress towards sustainable service delivery. Indiatimes. Inc.

Jwan, J., &Ong'ondo, C. (2011). Qualitative Research: An introduction to principles and Techniques. Eldoret: Moi University Press.

Kelly, E., Shields, K. F., Cronk, R., Lee, K., Behnke, N., Klug, T., & Bartram, J. (2018). Seasonality, water use and community management of water systems in rural settings: Qualitative evidence from Ghana, Kenya, and Zambia. *Science of The Total Environment*, *628*, 715-721.

Kinyanjui,M and Wanyoike,D (2016). Assessment of factors influencing sustainability of peri-urban water supply projects a survey of Nyahururu sub-county, Kenya. *International Journal of Economics, Commerce and Management Vol. IV (5).*

Kipkeny, J (2014). *Factors affecting sustainability of community managed hand pump operated shallow wells as rural water supply system in Garissa sub-county* (Doctoral dissertation, University of Nairobi).

Kitur, N (2015). *Factors influencing sustainability of water resource projects by women in Sotik sub-county, Bomet county, Kenya* (Doctoral dissertation, University of Nairobi).

Lencha, A. (2015). Rural water supply management and Sustainability in Ethiopia with Special Emphasis on Water Supply Schemes in Adama Area. Sweden: Swedish University of Agricultural Sciences.

Kothari, C. (2007). Research Methodology: Methods and Technology. New Delhi: India: New Age Publication.

Lewin,P (1952). Group behavior. Group Participation. New York-CRC Press.

Maina, B. M.(2013).Influence of stakeholders' participation on the success of the economic stimulus programme: A case of education projects in Nakuru County, Kenya. *Unpublished project*. University of Nairobi.

Mugenda, O., &Mugenda, A. (2003). Research methods: Quantitative and Qualitative Approaches. Nairobi: Acts

Mulwa,F (2008). Participatory Monitoring and evaluation of community projects. Paulines publications Africa, Nairobi Kenya

Mungolia, R G (2019). Resource Supplies for Low-Income Communities in Developing Countries, *Journal Environmental Engineering Division ASCE.*

Muruli, D (2016). Factors influencing sustainability of water supply projects in Kenya. University of Nairobi, Unpublished M. AThesis,

Mutonga,B (2015). *Factors Influencing Sustainability of Donor Funded Community Water Projects: a Case of Kitui Central Constituency, Kitui County, Kenya* (Doctoral dissertation).

Narayan, D (2005). The contribution of people's participation: Evidence from 121 rural water supply projects". Washington, DC: The World Bank.

Nwasco, 2015). Sustainable Urban Communities: Challenges and Opportunities in Kenya's Urban Sector. *Centre for Promoting Ideas, US.Inc.*

Pretty, M (2016). Making soil and water conservation sustainable: from coercion and control to partnership and participation, *Land Degradation and Development 11(6).*

Rogers, E.M. (1983). *Diffusion of innovations***.** New York, US: Free Press

Rogers, P & Hall, A (2003). Effective water governance. TEC background paper no. 7. Global Water Partnership (GWP), Sweden.

Samantha, S (2018). Ecosystem-based adaptation to climate change: concept, scalability and a role for conservation science. *Perspectives in Ecology and Conservation*, *15*(2), 65-73.

Satterthwaite, D. (2016). Missing the Millennium Development Goal targets for water and sanitation in urban areas. *Environment and Urbanization*, *28*(1), 99-118.

Stacey Noel, John Soussan, and Jennie Barron.(2015).Water And Poverty Linkages In Africa: Tanzania Case Study. *International.org.*

Saunders, M., Lewis, P & Thornhill. A, (2009). Research methods for business students. 5th Ed, Pearson Education UK.

Turner, J. R. (2014). *The handbook of project-based management* (Vol. 92). McGraw-hill.

Watt,A(2013 *Project Management,* [e-book], Available http://bccampus. pressbooks.com/project management.

Weinmeyer, R., Norling, A., Kawarski, M., & Higgins, E. (2017). The Safe Drinking Water Act of 1974 and its role in providing access to safe drinking water in the United States. *AMA journal of ethics*, *19*(10).

WHO, 2015).*Human Development Report 2015 –Beyond scarcity: Power, poverty and the global water crisis. New York:*United Nations Development Programme

World Health Organization. (2016). *World health statistics 2016: monitoring health for the SDGs sustainable development goals*. World Health Organization.

World Water Assessment Programme, (2013). Community Water Supply and Sanitation Project.Pub.Int.Ich.

WSP (2015) Water Resources Management Authority. Performance Contract Report, Nairobi, Kenya.