PROJECT IMPLEMENTATION AND SUSTAINABILITY OF WATER AND SANITATION PROJECTS IN NYERI COUNTY, KENYA

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ABSTRACT

The perceived success in project implementation is more adequately defined as meeting the project's technical specification or mission while at the same time attaining a high level of satisfaction on the part of the community, clients, users and the project team. This means that parties associated with and affected by a project should be satisfied at the same time that the good cost and schedule performances are realized. This study intended to establish effect of project implementation on project sustainability of water and sanitation projects in Nyeri County. Water and sanitation provision coverage has remained low even with continued investment by the Government and donor agencies in the sector through various projects. Water Services Regulatory Board through its annual reports on water and sanitation provision status has queried the disparity between the amount of investment towards water and sanitation projects and the corresponding rate of growth in the service coverage. The study sought to determine effect of project implementation on sustainability of water and sanitation projects in Nyeri County through various variables. These are technical capacity, government support, and project funding and community participation. The study was guided by McKinsey 7s model, Porter's value chain mode, Mintberg's organizational model and Theory of change theories. The target population consisted of 94 members of the community made up of managers of water service providers, administrative and community leaders. A sample size of 40% of the target population was drawn. Stratified random sampling design was adopted to select the respondents. The study used a cross sectional descriptive survey research design using quantitative approach to data collection, analysis and reporting through some elements of qualitative approach to data. Data was collected using questionnaires and analyzed quantitatively with the aid of the Statistical Package for Social Science (SPSS). Analysis of results indicated below standard levels of sustainability of water and sanitation projects as indicated by water quality and operations and maintenance cost coverage. However, the hours of water supply as a dimension of sustainability was found to be within the benchmark standards set by regulators. Regression analysis results indicated that technical capacity, project funding, community participation and government support all have a positive and statistically significant effect on sustainability of water and sanitation projects in Nyeri County, Kenya. The study recommends that project management teams device ways to upscale the quality of water supplied and operations and costs coverage which was poor. As project funding was found to be the most significant determinant of sustainability of water and sanitation projects, the study recommends that more funds be channelled to projects timing of disbursements enhanced.

Key Words: *project sustainability, project implementation, water and sanitation projects, technical capacity, project funding, community participation, government support*

INTRODUCTION

Lack of improved water and sanitation sources remains a serious world health and environmental issue. Over 1.1 billion people use water from unimproved sources, and 2.4 billion have no access to any form of improved sanitation (United Nations, 2015). According to the World Health Organization (WHO), achieving the Sustainable Development Goals (SDGs), drinking water and sanitation target poses two major challenges: a rapid pace of urbanization, which requires major effort even to keep up the current coverage levels; a huge backlog of rural people unserved with basic sanitation and safe drinking water, which calls for an intensive mobilization of resources to reduce the vast coverage gap. In Sub-Saharan Africa, over the period 1990-2009, the number of people without access to drinking water increased by 23% and the number of people without sanitation increased by 30%. Therefore, more intensive, effective and concerted action by all stakeholders is needed if the SDGs drinking water and sanitation is to be achieved (WHO and UNICEF, 2010). The lack of sanitation services is also compounding problems of environmental degradation and associated poverty levels around the world. In response to this crisis, international organizations have listed water and sanitation interventions among the top development priorities.

To achieve this, investment in water and sanitation projects especially in the developing countries needs to be enhanced. In addition, such projects must be environmentally, economically and socially sustainable in order to benefit the target population. According to Korir (2012), the process of project implementation involves the successful development and introduction of projects in the organization, thus presents an ongoing challenge for managers. The project implementation process is complex, usually requiring simultaneous attention to a wide variety of human, budgetary and technical variables. As a result, the organizational project manager is faced with a difficult job characterized by role overload, frenetic activity, fragmentation and superficiality. Sustainability of water and sanitation projects largely depends on the implementation of the specific projects which could be affected by such variables as technical capacity, community participation, funding, and government support.

STATEMENT OF THE PROBLEM

Nyeri County has a population of over 1,000,000 people (National Population Census, 2009). However, according to Water Services Regulatory Board (WASREB) reports, it is only 40% of the population who have access to clean drinking water with sewerage coverage within urban centres in the county at about 35%. During the last 10years the county has benefited from funding to undertake water and sanitation projects both from the Government and other organizations such as Japan International Cooperation Agency (JICA), the World Bank and Water Sector Trust Fund (WSTF). Though this has translated into improved water and sanitation coverage in some parts of the county, most of the projects do not achieve the desired results

hence overall poor service coverage. WASREB through its annual reports on water and sanitation provision status has queried the disparity between the amount of investment towards water and sanitation projects and the corresponding rate of growth in the service coverage. While it is evident that Government and other development partners have funded various water and sanitation projects in the County over time, majority of residents especially in the rural areas have continued pouring their frustrations to the political leadership and service providers for lack of adequate water supply and proper sanitation due to failure of some projects in meeting their expected outcome. Korir (2012) attributed failure of past water and sanitation projects to mismanagement and lack of involvement of communities in the design and implementation of the projects. However, the study failed to evaluate the effects of project implementation on sustainability of water and sanitation projects. This study therefore sought to evaluate the various variables in the implementation of water and sanitation projects that may affect the economic, environmental and social sustainability of such projects. The study established the effect of technical capacity of the project implementation team and levels of government support, project funding and community participation on the sustainability of water and sanitation projects in Nyeri County.

THEORETICAL REVIEW

McKinsey 7s Model

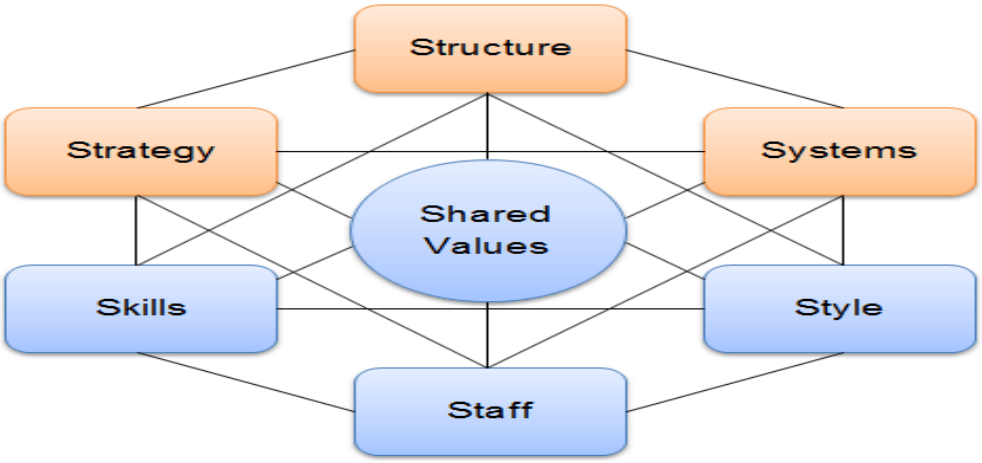

Figure 1: Adopted from McKinsey 7s model

Source: (Jurevicius, 2013).

According to the sentiments of Singh (2013), McKinsey 7s model is a framework that was developed in the 1980s by a group of consultants from McKinsey. As a strategic planning tool, the McKinsey 7s model has been applied widely by practitioners as well as academics since its introduction. As outlined by Palatkova (2011), the McKinsey 7s model, particularly provides an illustration on how 7 elements of every company (including strategy, structure, skills, style, staff,

shared values, and systems) can be aligned to promote effective organizational operations. The figure below represents McKinsey 7s model. It particularly represents the connection between the seven areas of an organization.

This theory was therefore relevant to this study as the seven elements of an organization can be seen to influence the level of technical capacity within an organization that may affect implementation of water and sanitation projects hence their sustainability of the said projects. The same can be said of the effect of community participation in project implementation. Community participation may also the form of an organization as a community is made up of various elements and which must be well coordinated in order to realize positive results.

Porter's Value Chain Model

Porter's value chain model describes the value chain, which entails different activities that an organization within a particular industry undertakes with the view of providing the customers with a valuable good or service in the market. These activities are divided into the primary and the support activities. The primary activities include inbound logistics, operations, outbound logistics, marketing and sales, and service. On the other hand, the secondary or support activities include the firm infrastructure, technology development, human resources development, and procurement (Karvonen & Kraslawski, 2012). The value chain model underpins technical capacity variable thus can be employed in project management to make certain that a project creates value for the intended customers. In particular, Porter's value chain enables project managers to understand how much value the project teams have put into any given project. The figure below represents Porter's value chain model; it identifies the primary and support activities that a firm has to perform to provide its target customers with a valuable product.

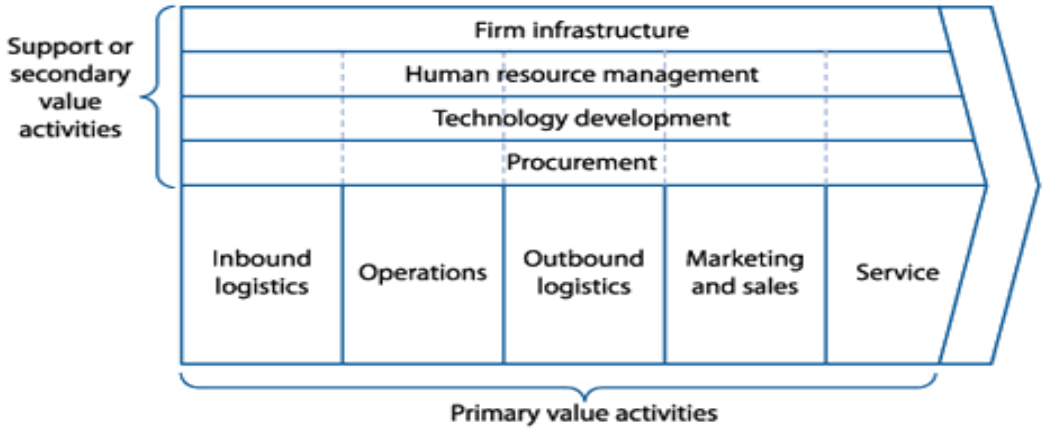

Figure 2: Porter's generic value chain model

Source: (Kaplan Financial Knowledge Bank, 2017)

Mintzberg's Organizational Model

This model divides an organization into the following parts. These include ideology, strategic apex, medium level, techno structure, supporting forces and operating core.

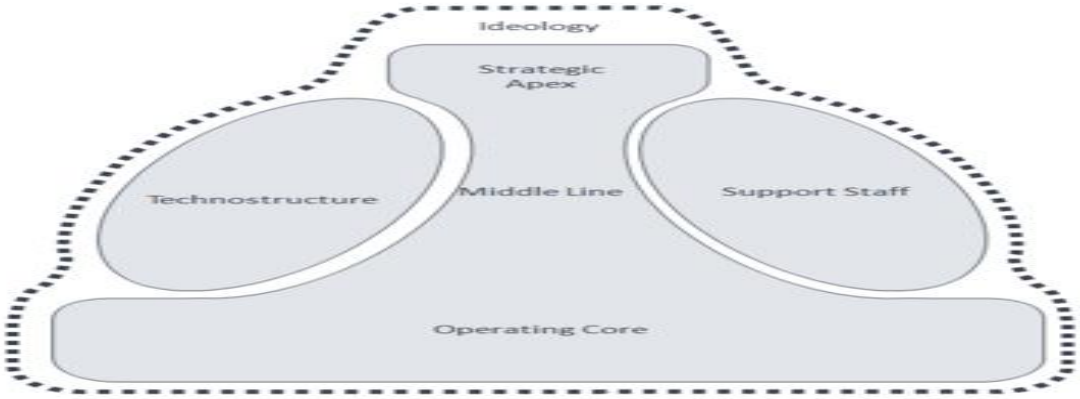

Figure 3: Mintzberg's Organizational Model

Source: (Barnat, 2015)

The different parts of an organization have developed and variously reflected in individual part. Each of the parts pulls the organization in a particular direction that seems favorable to them. This theory relates with community participation variable of the study. The various parts of an organization can be equated to the factors that influence successful completion of water and sanitation projects hence the sustainability of such projects.

Theory of Change

This theory illustrates the process of change by outlining the interrelations in an initiative or project. The linkages can be illustrated as follows;

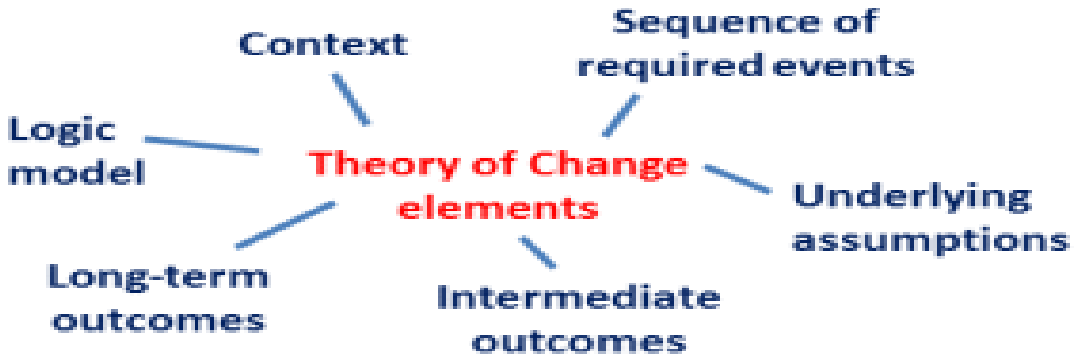

Figure 4: Theory of Change Model

Source: (Allen, 2017)

The theory attempts to differentiate between the desired and actual results and in requiring stakeholders to model their desired results before they can decide on the nature of intervention in order to achieve the objectives of the project. This theory underpins technical capacity variable as training of personnel involved in project implementation act as agents of change to impact on successful project implementation.

EMPIRICAL REVIEW

Organizational and Community Training

Human resource development is part of the technical capacity required to promote the sustainability of community water and sanitation projects. Under this perspective, human resource development entails the provision of specialized training of the project staff, project managers, and community members as part of the project team that will facilitate project success and sustainability (Montegomery & Elimelech, 2009). Sharing similar views, Campos (2008) points out that the element of community training enables the community members to acquire significant skills to operate and maintain project technology and equipment. As a result of such training, the community members become empowered to look after the water supply systems as a prerequisite for sustainability. According to Ademiluyi and Odugbesan (2008), inadequate or lack of community and organizational training is among the factors that adversely affect the success and sustainability of rural-based water and sanitation projects in developing nations. The study further assert that empowering community members with the necessary skills is significant as it enables the community to take ownership of water projects long after the donors, project managers, and other stakeholders have accomplished their duties. However, the study is inadequate on establishing measures of promoting functional sustainability of water and sanitation services.

Project Management Competency

Project management competency is an integral part of the technical capacity required in project implementation to promote project success and sustainability. When dealing with rural-based or community projects, project management entails aligning the project execution with the priorities of the local community. Such an alignment goes a long way in facilitating increased project ownership among the community members in addition to promoting efficiency in project execution. In simpler terms, it entails providing effective leadership in project execution with the view of attaining the set project objectives. In line with the words of McDade (2004), efficiency in project management makes certain that there is sufficient capacity and resources to promote project success and sustainability. According to the views of Weinberg (2008), community projects are very multifaceted and as such call for versatile or adaptable management skills if success and sustainability are to be attained. The study further ascertains that the project manager

is expected to apply not only the skills related to project management but also the technical expertise required to address the complexity of the project. There is a feeling however that, these views do not consider implementation of water and sanitation projects in rural area.

Project Funding and Sustainability of Water & Sanitation Projects

Regular and sufficient funding is among the main conditions that promote smooth project operations without unnecessary disruptions and/or stoppages. Under this perspective, on schedule and regular progress of project activities on site require adequate cash flow to make certain that the required equipment and materials are procured on time. In addition, the project teams require to be remunerated adequately to ensure that they have the right motivation for increased productivity. In many water and sanitation projects, poor performance and delays in project completion are as a result of financial shortcomings such as delays in paying the project human resources, poor financial resource management, significant delays in paying for completed works, and so forth. On many occasions, contractors lack the necessary financial capacity to keep the project execution ongoing; per se, delayed payments and/or release of project funds becomes one of the factors challenging project success and sustainability (Aftab et al., 2012). However, the study is lacking in determining cost and time performance indicators in sustainability of water and sanitation projects.

Community Participation and Sustainability of Water & Sanitation Projects

The existing literature establishes a positive relationship between community participation and the sustainability of water and sanitation programs within the rural areas. In one of such studies, Das and Takahashi (2014) paid attention to the institutional determinants of the impact of community-based water services within India, Indonesia, and Sri-Lanka. The results of the study ascertained that within India, Indonesia, and Sri-Lanka, community participation in water and sanitation projects enhance water supply and sustainability. In relation to sanitation, the study further found out that community water projects go a long way in improving the health and wellbeing of the rural communities. In a similar study, Keli (2015) focused on beneficiary participation in development projects. The study results revealed that the element of community participation in rural projects plays a significant role in promoting project effectiveness especially in relation to building capacity for collective action. However, the two studies did not evaluate the impact of community participation in water and sanitation projects undertaken by structured institutions such as WSPs.

Government Support and Sustainability of Water & Sanitation Projects

In every jurisdiction, the government is responsible for promoting sustainable development, through appropriate policy frameworks, with the view of alleviating poverty. In addition, the

sustainable development goals should also aim at improving the living standards of the people. Investing in sustainable community water and sanitation projects is one of the ways in which the government attains its sustainable development goals while still uplifting the living standards of the people. In Kenya, the constitution of the year 2010 devolved the provision of water and sanitation services from being a national government function to being under the functions of the county governments. As such, every county government has the responsibility of ensuring that all its citizens have access to clean and safe water for domestic consumption. However, the national government still collaborates with the county governments in major water and sanitation projects with the view of promoting their sustainability. Such collaborations are done through the Ministry of Water and Irrigation, which is in charge of water services in Kenya (Macharia et al., 2015). The researcher however failed in establishing the implications of devolution of water services on government funding in water and sanitation projects.

RESEARCH METHODOLOGY

This study adopted a cross sectional design and descriptive survey research design. Target population included 94 stakeholders of water and sanitation projects within Nyeri County. Stakeholders including the management staff of WSPs, water project managers, community leaders and community leaders within the county. A purposive stratified simple random sampling was applied. Managers from WSPs, project managers or leaders from each project within Nyeri County and community leaders from each ward in the county formed the population for the study. From the population, a 40% sample was selected randomly of each stratum. This was a good representation of the target population and gave an adequate sample size of 38 stakeholders for analysis. While there are different tools for collecting primary data, this study relied on structured questionnaires in the investigation of project implementation and sustainability of water and sanitation projects in Nyeri County. Before embarking on the data collection process, all the participants were contacted and provided with the necessary details including the date, time, and the venue for data collection. The identified five regions within Nyeri County had different dates and venues for data collection. With each of the five regions having maximum of 11 research participants, the enumerators were expected to have easy time collecting data in each region for five days. The respondents had the entire day to fill in the questionnaires; however, the average time for filling the questionnaire across all the five regions was one hour. The study allowed the respondents to seek clarifications from the research assistants at any point while answering the questionnaire questions. After collecting the questionnaires, the first step in the analysis process was data cleaning. Data cleaning was followed by the process of data coding. Data coding helped in summarizing and reducing the collected data and thereby simplifying the data analysis process. The study relied on tables and figures to summarize the coded data. This was made possible by the SPSS program that has a wide range of functions for summarizing data into tables and figures. On the other hand, the

inferential statistics generated included Analysis of Variance (ANOVA) and multiple regression analysis. The multiple regression model was used with the following function:

$$Y= \beta_{0+} \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + Ɛ$$

Where: β_0 - Y intercept, β_1, β_2, β_3, β_4 are coefficients, X_1 - Technical capacity, X_2 - Project funding, X_3 - Community participation, X_4 – Government Support and Ɛ - Error Term

RESEARCH RESULTS

The study sought to determine the effect of project implementation on sustainability of water and sanitation projects in Nyeri County, Kenya. Specifically, the study sought to determine the effect of Technical Capacity, Project Funding, Community Participation and Government Support on Sustainability of Water and Sanitation Projects. Sustainability was indicated through quality of water, hours of supply and coverage of operational and maintenance costs. On Sustainability of Water and Sanitation Projects, analysis results indicated that quality of water supplied by both regulated and unregulated water projects was found to be way below acceptable standards. The hours of water supply by individual projects was found to satisfactorily above average. Notably, for regulated water projects, the condition of water supply was found to be excellent with some providing water throughout the day. Analysis results further demonstrated a poor coverage of operations and maintenance cost for both regulated and unregulated projects. The Coefficient of Determination indicated that more than two thirds of variation in sustainability of water and sanitation projects was explained by project implementation variables; Technical Capacity, Project Funding, Community Participation and Government Support, included in the model.

Regarding technical capacity as a dimension of water and sanitation project implementation, there was high agreement that the projects had attached competent technical and management staff. However, results indicated that the personnel had only moderate level of skills and competence to oversee the nature of water and sanitation projects undertaken in the area (s). It was also indicated that project task teams were established during the implementation of water and sanitation projects in the areas. The constitution of those teams was however questioned with participants only moderately approving their constitution condition. One Way Analysis of Variance results indicated that technical capacity has a significant effect on sustainability of water and sanitation projects in Nyeri County, Kenya. Regression analysis results indicated that Technical Capacity has a significant, positive effect on Sustainability of Water and Sanitation Projects. On Project Funding as a component of Project implementation, participants were largely of the opinion that the project funds were not adequate for proper implementation of Water and Sanitation Projects. It was further indicated that disbursements of funds for the water and sanitation projects hardly conformed to timelines established. One Way Analysis of Variance results indicated that Project Funding has a significant effect on Sustainability of Water and Sanitation Projects in Nyeri County, Kenya. Regression analysis results demonstrated that

Project Funding has the highest, positive and statistically significant effect on Sustainability of Water and Sanitation Projects.

On community participation, as a facet of project implementation, it was held that the community was largely involved in design and implementation of the projects. Participants largely supported community participation and agreed on its positive impact on the performance of water and sanitation projects. Results from the One Way ANOVA indicated that Community Participation has a significant effect on Sustainability of Water and Sanitation Projects in Nyeri County, Kenya. Regression analysis results indicated that Community Participation has a significant, positive effect on Sustainability of Water and Sanitation Projects. Regarding government support as a variable of project implementation, results indicated that the government had funded and supervised just one or two water and sanitation projects in each area. It was established that inspection, monitoring and evaluation of projects by government officials was done frequently. The One Way Analysis of Variance results indicated that Government Support has a significant effect on sustainability of water and sanitation projects in Nyeri County, Kenya. Regression analysis results indicated that Government Support has a significant, positive effect on Sustainability of Water and Sanitation Projects.

INFERENTIAL STATISTICS

The multiple regression analysis was applied to determine the effect of project implementation on sustainability of water and sanitation projects. Table 1 provides the output of the F test.

Table 1: F- Test on ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	201.342	4	50.336	102.001	.001
	Residual	19.580	28	.699		
	Total	220.922	32			

a. Predictors: (Constant), Technical Capacity, Project Funding, Community Participation, Government Support

b. Dependent Variable: Sustainability of Water and Sanitation Projects

At the 5% significance level, the study got enough evidence to assume that the gradient of the regression line was not zero. This is because the p value of 0.001 is less than 0.05 or 5% level of significance. Therefore, at least one of the project implementation variables; Technical Capacity, Project Funding, Community Participation and Government Support was a useful predictor Sustainability of Water and Sanitation Projects. Table 2 presents the regression model summary.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.780[a]	.608	.606	.20713	1.781

a. Predictors: (Constant), Technical Capacity, Project Funding, Community Participation, Government Support

b. Dependent Variable: Sustainability of Water and Sanitation Projects

R Square, the Coefficient of Determination stands at 60.80. This implies that 60.80% of variation in sustainability of water and sanitation projects was explained by project implementation variables; Technical Capacity, Project Funding, Community Participation and Government Support, included in the model. As such, only 39.20% of variation in sustainability of water and sanitation projects was explained by other factors, not included in the model. Table 3 provides the multiple linear regression coefficients table.

Table 3: Model Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.118	.076		1.639	.009
	Technical Capacity	.654	.311	.501	2.573	.001
	Project Funding	1.971	.164	.444	2.830	.021
	Community Participation	.090	.406	.516	2.363	.013
	Government Support	.329	.504	.322	3.902	.036

a. Dependent Variable: Sustainability of Water and Sanitation Projects

The coefficient for Technical Capacity (0.654) has a p-value of 0.001 which is within the 5% level of significance. This demonstrates that Technical Capacity is a useful predictor of Sustainability of Water and Sanitation Projects. The statistics show that a unit improvement in Technical Capacity would lead to a 0.654 unit increase in Sustainability of Water and Sanitation Projects. The results agree with Ademiluyi and Odugbesan (2008), Mengesha et al. (2003) and Macharia et al. (2015) who also indicated that Technical Capacity influences Sustainability of Projects. The coefficient for Project Funding (1.971) has an associated p-value of 0.021. The p-value is less than 5% level of significance. A conclusion was reached that Project Funding was a significant, positive predictor of Sustainability of Water and Sanitation Projects. An additional implication is that a unit increase in Project Funding would lead to a 1.971 increase in Sustainability of Water and Sanitation Projects. The study results agrees with Odhiambo (2010), Tawil et al., (2013) and Aftab et al., (2012)who indicated that insufficient funding directly

translates to poor maintenance of water and sanitation projects after completion and thereby affecting the long term sustainability of projects.

The coefficient for Community Participation (0.090) has an associated p-value of 0.013 which is less than 5% or 0.05 level of significance. This demonstrates that Community participation is a significant predictor of Sustainability of Water and Sanitation Projects. To that effect, a unit increase in community participation would result in a 0.090 unit improvement in Sustainability of Water and Sanitation Projects. The results agree with Das and Takahashi (2014) and Keli (2015) who also established that community participation in water and sanitation projects enhance water supply and sustainability. The results however disagree with Cooke and Kothari (2001) who indicate that community participation may not significantly affect the sustainability of projects.

Finally, the coefficient for Government Support (0.329) has an associated p–value of 0.036. The p-value is below the 5% cut off point for statistical significance. Therefore, Government Support is a significant determinant of Sustainability of Water and Sanitation Projects. Further, the results imply that a unit increase in Government Support would result in a 0.329 unit increase in Sustainability of Water and Sanitation Projects.

Sustainability of Water and Sanitation Projects = 3.118 + 0.654 (Technical Capacity) + 1.971 (Project Funding) + 0.090 (Community Participation) + 0.329 (Government Support).

CONCLUSIONS

On Sustainability of Water and Sanitation Projects, the study concludes that the projects sustainability condition was below acceptable levels. Only hours of supply was seen to meet the acceptable benchmark with poor condition of quality and cost coverage indicated. However, regulated service providers evidently performed better than those not regulated by WASREB. On Technical Capacity, the study concludes that although projects had technical and management staff attached their skills and competency base needed enhancement. The constitution of project task teams also required to be addressed. One Way Analysis of Variance results informed a conclusion that technical capacity influences the sustainability of water and sanitation. Further, regression analysis results informed a conclusion that Technical Capacity has a significant, positive effect on Sustainability of Water and Sanitation Projects. On project funding, the study concludes that project funds neither were rarely adequate for proper implementation of Water and Sanitation Projects nor were disbursements placed in time. One Way Analysis of Variance informed a conclusion that Project Funding is a useful determinant of Sustainability of Water and Sanitation Projects. Regression analysis results further informed a conclusion that the effect of Project Funding on Sustainability of Water and Sanitation Projects is strong and positive.

On community participation, the study concludes that the condition of engagement was satisfactory. Results from the multiple regression analysis informed a conclusion that

Community Participation significantly influences the Sustainability of Water and Sanitation Projects. Regression analysis results further led to a conclusion that the effect of Community Participation on Sustainability of Water and Sanitation Projects was positive. On Government Support, the study concludes that the government had funded and supervised just a few water and sanitation projects. The Regression analysis and One Way Analysis of Variance results informed a conclusion that Government Support positively influences effect on sustainability of water and sanitation projects.

RECOMMENDATIONS

Key policy recommendations are made based on the unique findings of the study. The study recommends that project management teams device ways to upscale the quality of water supplied and operations and costs coverage which was poor. The study makes recommendations on need to enhance the state of Project Implementation that would enhance the Sustainability of Water and Sanitation Projects. As the study finds that regulated water projects evidently performed better than the ones not regulated, the study recommends more regulatory framework for projects. On Technical Capacity, the study recommends measures to build up the skills and competence of technical and management staff attached to projects as this was found not to be satisfactory. The study further recommends reconstitution of project task teams to reflect the face of all stakeholders. Technical Capacity, generally, should be enhanced to improve Sustainability of Water and Sanitation Projects.

The study recommends that more funds be channelled to projects as project funding was found to be most significant determinant of Sustainability of Water and Sanitation Projects. Notably, projects funding were found to be inadequate which could be having adverse effects on Sustainability of Water and Sanitation Projects. There is also need to enhance efficiency of disbursements which was found to be poorly done. On community participation, the study recommends enhancement of the condition of engagement of community members to create ownership and goodwill. The government needs to support more projects through funds and supervision. Notably, only a few projects had been funded and supervised by the government.

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