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Towards Sustainable Water Supply: Enhancing Project Accountability Practices in Water Supply Projects Within Nairobi City County's Informal Settlement Areas

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Abstract

Sustainability of water supply has over the years become a key concern for the global community due to water stress and scarcity attributable to climate change and other anthropogenic factors. This is especially crucial for urban areas where increased rural-urban migration has brought population increases, thus raising the demand for basic services and infrastructure. The concerted efforts of water sector stakeholders have seen to, among other strategies, the implementation of water supply projects in affected areas. In Kenya, however, the statistics show that these water supply projects have reported high failure rates with the existing systems failing to operate at full capacity. The study sought to investigate the effect on the effect of accountability on the sustainability of water supply projects in Nairobi City County's informal settlement areas. A sample of 260 project leaders of water supply projects was considered in this study. Data was collected using structured questionnaires, and both descriptive and inferential data analysis was conducted. The findings revealed that accountability has a positive and statistically significant effect on sustainability and that strengthening accountability practices such as monitoring and evaluation, managerial evaluation, and transparency would bolster project sustainability.

Keywords: Project Sustainability, Accountability, Project Evaluation, Managerial Assessment, Transparency

Introduction

The publication of the 1987 Brundtland Commission report dubbed "Our Common Future" set in motion the global discourse on project sustainability. Project implementers across the globe now strive to ensure projects remain sustainable in light of diminishing natural resources and continuous developing uncertainties (Chawla, Chanda, Angra, & Chawla, 2018). As a vehicle through which change and innovation is made in society by state and non-state actors, projects have been widely adopted owing to the immense contribution they make to economic growth and development especially in developing as countries (Aarseth, Ahola, Aaltonen, Okland, & Andersen, 2016).

Projects account for approximately one-third of the global Gross Domestic Product (Okland, 2015) and act the stimulus for developmental assistance offered by bilateral and multilateral organizations (Yamin & Kim 2016).

Despite the increase in project activity, there is global evidence of failure across various sectors with 20-50 percent of projects failing to meet their quality, schedule and budget constraints (Standing, Standing & Kordt, 2016; Ika, Diallo & Thuillier, 2012; Kusek, Prestidge & Hamilton, 2013). Given the temporary nature of projects and the high project failure rates, there has been an upsurge of interest in making the project results and benefits sustainable to secure the continuity of the economy and society in general (Sabini, 2016). Therefore, the integration of project sustainability principles in project management to harness projects' economic potential is essential.

The International Fund for Agricultural Development-IFAD (2009) posits that sustainability is attained at the point where the institutions supported through specific projects and the benefits generated by those projects continue even after project termination. A broader perspective offered by the 1987 Brundtland report, provides that sustainable development should, in essence, meet the needs of the present without jeopardizing the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987).

The water supply challenge

The precursor to the implementation of water supply projects is the global water crisis that has resulted from deforestation, destruction of water towers, and wetland encroachment. Water is a basic human right and need which should be managed and distributed in an equal, conservational, and sustainable way. Roy, Akshintala, and Sharma (2013) however note that there exists an uneven distribution of water supply services, especially to marginalized social groups. The United Nations Development Programme (2017) electronic portal on the Sustainable Development Goals (SDGs) also reports that water scarcity is a problem faced by more than 40 percent of the world's population. This figure is likely to increase given the impact of climate change that has introduced a new set of demands on water resources.

In Africa, a report on the World Bank's Water and Sanitation Program highlights that only 61 percent of the continent has access to drinking water, lagging behind the rest of the world (The World Bank, 2015). Further, data given by The Water Project (2016) estimates that approximately 319 million people in Africa do not have access to an improved water source. The problem of water scarcity has led to issues like diseases, with 80 percent of illnesses attributable to water shortage and exposure to unsafe drinking water. Moreover, 42 percent of the continent's health facilities lack an improved water source within a distance of 500 meters. In households where there is a water shortage, about 64 percent of them depend on women and girls to get water for their homes with over 40 billion hours spent annually collecting water. Besada and Werner (2015) also note that due to water scarcity, about 30 percent of the population in the continent suffer from chronic hunger, one of the highest rates globally.

Sub-Saharan Africa is one of the most vulnerable regions due to low institutional capacity and high dependency on subsistence agriculture. In the region, subsistence agriculture accounts for about 25 percent of the GDP and employs approximately 70 percent of the population. In addition, water is a vital factor of production in many industries, therefore, diminishing water supplies could translate to slower business expansion hampering general economic growth (The World Bank, 2016). In Kenya, about 17 million people lack access to safe water, which has a negative impact on health, education, and other aspects of social and economic development (Water Services Regulatory Board, 2016). Organizations dealing with water supply are faced with the challenge of dividing the amounts of water in the diminishing resources amongst the competing household consumption, agricultural, industrial and other water needs (Network of African Science Academies, 2014). Therefore, stakeholders are seeking more sustainable solutions to the water crisis. There is a demand for innovative solutions that meet global standards as well as cater for the anticipated economic and population growth without placing undue strain on local water resources (COWI Africa, 2015).

As a panacea for the water crisis, the global community has consequently embraced SDG 6: "Ensure availability and sustainable management of water and sanitation for all" with clear targets to be achieved by the year 2030.

Therefore, governments working in collaboration with international and local development organizations and other stakeholders have initiated water supply projects. The projects strive to ensure there is adequate water to meet societal and economic needs because water scarcity affects, among others, food security, livelihood choices, and educational opportunities. In Kenya, under Vision 2030, the nation's development blueprint, the plan is to ensure improved water and sanitation is available and accessible to all. The reason for this is that water is the key driver for many other sectors majorly agriculture (Government of the Republic of Kenya, 2007). Water supply projects may take the form of pipelines laid, yard taps and in many developing countries, water kiosks. These projects, like other infrastructure projects, are critical to economic growth and sustainable development.

According to Bakker (2013), as much as water supply has become a key goal in international development, theorists and development practitioners are caught between market failure and state failure, which renders project sustainability elusive. According to the Asian Development Bank (2015), water sector projects reported the lowest sustainability rates, with about 53 percent of projects being unsustainable. Developing countries are plagued by a water demand versus supply mismatch, failure of built systems to operate at full capacity and inadequate finances to cater for the development of new systems and operations of existing ones (Behailu, Hukka, & Katko, 2016). Further, the authors note that 25 percent of water supply systems in Sub-Saharan Africa fail before the second year after the inauguration with corresponding non-functionality rates of 30-60 percent. Okereke (2017) reports that approximately 50,000 water supply points are not operational in Africa.

In Kenya, approximately 30 percent of the water supply projects are out of service at any one time (WaterAid, 2015). Rapid urbanization has also led to an influx of over half a million people annually, and the water sector now experiences a challenge in serving almost 8 million underserved citizens residing in low-income urban areas. These urban poor pay more for water supply compared to their counterparts with household connections (Water Services Regulatory Board, 2016). According to Ledant (2013), approximately 36 percent of Nairobi City County residents lack access to individual or communal piped water. Lack of water supply is more prevalent in low-income areas of the County, with access pegged at 12 percent. Out of the 1044 water supply projects implemented by the Nairobi City Water & Sewerage Company (NCWSC) in low-income areas of the County between June 2015 and June 2018, 303 projects are not operational, approximately 29 percent (NCWSC- Informal Settlements Region, 2018).

Accountability for sustainability

In light of the project failure rates and pressures from internal and external stakeholders to achieve project sustainability, the United Nations introduced Results-Based Management (RBM) in the 1990s to enhance its operational effectiveness and accountability. The first RBM principle is accountability, which development practitioners continue to stress in relation to project implementation. Accountability has been interpreted to mean the respective liability of parties working together towards common objectives. Governments are accountable to the citizenry, and project teams are accountable to donors and other stakeholders, suppliers are accountable to the project teams, and so on. Each project stakeholder must be held to account for the responsibilities assigned to them for the success of the project (United Nations Development Group, 2011). In the context of managing for results, the principle of accountability can be achieved when there is a commitment, measurement, enforcement, and creation of an enabling environment.

Commitment to accountability is contained in the agreements, declarations and monitoring and evaluation frameworks that project stakeholders subscribe to. Measurement relates to the development of indicators of performance and development of monitoring and evaluation systems to assess the actual project performance vis-à-vis the project targets. The issue of enforcement deals with who-holds-who accountable and should be spelt out in the project organization and reporting structures. An enabling environment for accountability also rests on the project structures in that projects should be organized in a way that enhances transparency and communication. Access to information is key to monitoring and evaluation of projects, and the project communication structure should include and address the needs of all the relevant stakeholders (Sohath, 2010).

In the context of water supply projects, which are, in essence, public infrastructure assets, the concept of accountability is three-pronged. The first aspect is Monitoring and Evaluation (M&E), the second is the managerial performance, and finally, there is transparency. M&E strengthens accountability within the project management structures of water supply projects. Muriungi (2015) studied the role of participatory monitoring and evaluation programs among government corporations. The study applied a case-study approach focusing on Ewaso Ng'iro North Development Authority. The study established that there was a significant relationship between participatory monitoring and evaluation and the success of projects, with project sustainability being one of the indicators of project success. The study by Muriungi analyzes the participatory approach of M&E, whereas the present study examines other aspects of monitoring and evaluation, such as managerial performance and project reporting. The present study also examined several projects rather than use a single case study to facilitate generalization of findings.

Kibet and Wanyoike (2015) studied the influence of effective monitoring and evaluation processes on sustainable community water projects in Baringo County. The study used a census approach whereby 100 water projects in the County were observed. The study applied both descriptive and inferential statistics. The findings of the study revealed that project sustainability was indeed influenced by effective monitoring and evaluation process. Further, the study recommended the need for user-friendly reporting tools to be availed to the community members for use in the M&E process. The present study mainly bridged a contextual gap whereby its focus is mainly on water supply projects in low-income urban areas. Moreover, beyond M&E processes, the current study has conceptualized accountability to encompass managerial performance and project reporting since project implementers owe it to the stakeholders to implement the project to the best of their capabilities.

A study conducted in seven districts of Dodoma-Tanzania by Mwendamseke, (2016) revealed that project implementation without proper M&E would ultimately lead to the collapse of the project. This is because faults within the sector, such as non-functioning water distribution points will go unnoticed slowing the government's efforts to meet its water supply targets. Further, it was established that monitoring ensured proper management of water supply services and enhanced technical support for the program. The projects under study had effected a quarterly monitoring system that served as a guide for improvement by highlighting priority areas for the projects as well as expected results. The main drawback of this study is that purposive sampling was used as a technique that is at risk of researcher bias (Saunders, Lewis and Thornhill, 2009). In addition, only descriptive statistics were used. No model was employed to test the significance and causality of the selected determinants on sustainability. The current study made use of an empirical model to examine the relationship between the variables.

Umugwaneza and Kule (2016) investigated the role of monitoring and evaluation on project sustainability on electricity infrastructure projects in Rwanda. The study used a case study approach and employed descriptive analysis and multiple regression analysis to examine the relationship between M&E and project sustainability. The study revealed that monitoring and evaluation is positively correlated to project sustainability and that M&E accounts for about 98% of the variations in project sustainability. The present study sought to investigate the relationship between accountability (evidenced through M&E) and sustainability by studying several projects rather than using a case study method. By surveying a number of projects, the researcher was in a better position to generalize the findings of the research.

Siriwardhane and Taylor (2017) in examining perceived accountability of local government infrastructure assets in Australia posit that managerial accountability is important since managers are answerable for how they utilize resources to meet organizational objectives. Managers are expected to be effective and efficient in organizational operations. As public infrastructure assets do not have a profit maximization objective, managerial accountability is assessed through comparison of actual performance to pre-set targets or indicators. This assessment encompasses both the manager's performance in discharging their duties as well as the overall health of the infrastructure asset. The Australian study focused mainly on stakeholder salience, especially considering the political interests and bargaining power of the respondents who were mainly elected public officials. In this study, accountability did not include political aspects but sought to assess in the Kenyan context, how managerial performance affects project sustainability.

The third aspect of accountability is transparency, which, in the majority of the literature available, has been termed sustainability reporting. Akhter and Dey (2017) conducting a study on sustainability reporting practices in Bangladesh, argue that sustainability reporting is a key tool in managing sustainability. However, since sustainability reporting is voluntary, only a paltry 26% of the sampled organizations report on one indicator out of the 40 (environmental, economic and social) indicators prescribed by the Global Reporting Initiative. In a study by Kiliç and Kuzey (2017) examining the factors affecting sustainability reporting in Turkey, the authors found that whereas sustainability reporting is deemed to boost organizational performance very few companies engaged in the practice. The longitudinal data used revealed that however, sustainability reporting is on the rise due to the increased awareness of its benefits. The two studies, however, examine the aspect of reporting within profit-making organizations while this study assessed reporting in the context of public projects.

Research Objective and Hypothesis

The study was guided by the following research objective:

- i. To examine the effect of accountability on sustainability of water supply projects in informal settlement areas in Nairobi City County, Kenya

The study was guided by the hypothesis below:

H₀₁: Accountability has no significant effect on sustainability of water supply projects in informal settlement areas in Nairobi City County, Kenya

Target population and sampling

The target population of this study comprised project leaders of the 741 water supply projects implemented by the NCWSC in informal settlement areas in Nairobi City County (the list of projects is provided in Appendix III). According to the NCWSC the informal settlement areas are divided into six regions, as shown in Table 1:

Table 1: Target Population

Region	Number of projects
North-Eastern	108
Northern	180
Southern	64
Western	47
Eastern	222
Central	120
Total	741

Source: NCWSC (2018)

The unit of observation was the project leader in each project. As such, the total number of respondents was 741, one for each of the projects in the sampling frame. The role of the project leader is to prepare and put into effect the project implementation programme, as such; the input of the project leader was valuable to the study.

Using Yamane (1967) formula for sample size determination, the procedure for obtaining the adequate sample is as follows:

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

Where: **n**= adequate sample size
N= Target population size
e = margin of error

Using the above formula, the adequate sample size in this case (given a 0.05 margin of error as recommended by Kothari (2004) for Social Sciences) is:

$$n = \frac{741}{1 + 741(0.05^2)} = 259.77 \approx 260$$

Given the population size, a sample of 260 was considered representative and adequate. Saunders, Lewis, and Thornhill (2009) posit that a sample size of 10% and above is considered adequate. A proportional distribution of this sample was then obtained from across the strata. The strata sample size was obtained using the formula offered by Pedhazur and Schmelkin (1991) shown below:

$$r = (c*s) / p$$

Where:

r – Number of respondents required from each stratum

c – Stratum population

s – the desired sample size (260)

p – target population (741)

Table 2 shows the distribution of water supply projects sampled from each region.

Table 2: Distribution of sample size

Stratum (Region)	Stratum Population	Sample Size [r= (c*s)/p]
North-eastern	108	38
Northern	180	63
Southern	64	23
Western	47	16
Eastern	222	78
Central	120	42
Total	741	260

Source: Researcher (2018)

The empirical model

The preferred model for this research was the multiple linear regression model. The model was appropriate as it facilitated the investigation of the causal effect of the independent variables (project evaluation, managerial assessment, and transparency) on the dependent variable (sustainability of water supply projects). The first three objectives were studied using the model below:

$$PS = \beta_0 + \beta_1 PE + \beta_2 MA + \beta_3 T + \epsilon \quad (3.1)$$

Where:

PS: Project Sustainability

PE: Project Evaluation

MA: Managerial Assessment

T: Transparency

ε: Error term

The coefficients $\beta_1, \beta_2, \beta_3, \beta_4$ measured the effect of explanatory variables: PE (Project Evaluation), MA (Managerial Assessment) and T (Transparency) on the dependent variable PS (Project Sustainability) respectively. The significance of the β s was used to test the corresponding hypothesis. The error term denoted by ϵ , represented all other factors affecting project sustainability other than the independent variables under consideration. A p -value < 0.05 means that the variable is significant, and vice versa (Field, 2013). Data were collected using structured questionnaires and analysed using SPSS version 22.

Research Findings and Discussions

Out of the targeted 260 respondents, 194 respondents successfully participated in the survey. Both descriptive and inferential analysis results are presented in the following subsections.

Descriptive Analysis Results

Table 3 presents means and standard deviations from the analysis of the respondents' views on statements related to the independent variables:

Table 3: Responses on Accountability

Statement	Mean	Standard Deviation
Project Evaluation		
Monitoring and evaluation exercises are conducted regularly in the project	3.72	0.656
External evaluators are at times engaged in the evaluation of the project	3.68	0.620
The recommendations made in the M&E reports are applied to steer the project back into course	3.82	0.655
Relevant project stakeholders are engaged in the M&E exercises	3.56	0.832
Aggregate score for project evaluation	3.70	0.342
Managerial Assessment		
There is a rigorous selection process to ensure that only qualified individuals are selected to form the project implementation team	4.12	0.625
There are clear reporting structures within the project implementation team	4.06	0.649
The performance of the project implementation team is appraised by the project sponsors	4.19	0.602
Action is taken on the project team members who are not performing their roles as expected	4.31	0.635
Aggregate score for managerial assessment	4.17	0.340
Transparency		
Project information is collected and documented in a project repository	3.80	0.544
After each evaluation exercise reports are prepared and communicated with the relevant stakeholders	3.92	0.655
There is full disclosure of project information to the various stakeholder groups according to their information needs	3.88	0.595
Aggregate score for transparency	3.87	0.390
Aggregate score	3.92	0.212

Source: Survey Data (2019)

The results in Table 3 show an aggregate score of 3.92 for the variable, accountability. The score indicates that the respondents agree to a large extent that the projects to which they are affiliated exercise accountability. A standard deviation of 0.212 implies that the respondents had similar views. Pertaining to the aspect of project evaluation, the findings yielded a mean of 3.70 showing that they agreed to a large extent that monitoring and evaluation exercises are regularly conducted in the project, external evaluators are at times engaged in the evaluation

exercises, the monitoring and evaluation recommendations are utilized for project improvement and that participatory evaluation is carried out. A standard deviation of 0.342 indicates that there was not much variation in the respondents' views.

Managerial assessment, the second indicator under the variable accountability yielded a mean of 4.17. This shows that the respondents agreed to a large extent that there are rigorous selection processes to ensure that only qualified individuals are selected to constitute the project implementation teams. There are also clear reporting structures within the team, and project sponsors hold the implementation team members accountable. The last indicator, transparency, yielded a mean score of 3.87 and a standard deviation of 0.390. It shows that the respondents agreed to a large extent that project information is stored in a repository, communicated with relevant stakeholders, and full disclosure is ensured in that communication. A standard deviation of 0.390 shows that the respondents shared similar views.

Inferential Analysis Results

This section presents and discusses the inferential analysis results.

Table 4 shows an R^2 value of 0.7050, which means that approximately 70.5 percent of the variation in the dependent variable is attributable to the independent variables under consideration in this study. The remaining variance is attributable to factors beyond the scope of this study. Further, the Analysis of Variance (ANOVA) results in Table 5 indicate that $F = 155.411$ with a p-value of 0.000 (threshold is $p < 0.05$). This implies that the regression model adopted was suitable for the study and was used for further statistical analysis.

Table 4: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.8396	0.7050	0.7003	0.002
a. Predictors: (Constant), Transparency, Project Evaluation, Managerial Assessment				

Table 5: ANOVA

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	82.716	3	27.572	151.411	.000
	Residual	34.608	190	0.1821		
	Total	117.324	193			
a. Dependent Variable: Sustainability						
b. Predictors: (Constant), Transparency, Project Evaluation, Managerial Assessment						

The results from the regression analysis shown in Table 6 produced a beta coefficient of 0.213, 0.181, and 0.172 for project evaluation, managerial assessment, and transparency, respectively. The corresponding p-values are all below 0.05. The beta coefficients of 0.213, 0.181, and 0.172 indicate that the relationship between the dependent variables and project sustainability is positive. A positive relationship implies that an increase in the implementation of accountability practices would lead to an increase in project sustainability. The p-values all below 0.05 indicate that the independent variables have a statistically significant effect on project sustainability. Therefore, the null hypothesis was rejected, implying that accountability has a significant effect on the sustainability of water supply projects in Nairobi City County, Kenya.

Table 6: Coefficients

Coefficients						
Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.200	0.392		5.613	0.000
	Project Evaluation	0.213	0.061	0.143	3.4918	0.000
	Managerial Assessment	0.181	0.061	0.104	2.9672	0.000
	Transparency	0.172	0.054	0.065	3.1851	0.000
a. Dependent Variable: Sustainability						

The findings of the study were consistent with the findings of Kibet and Wanyoike (2015), who from a study of 100 community water projects in Baringo County, established that effective monitoring and evaluation procedures enhance project sustainability. Further, the findings also corroborate the evidence documented by Muriungi (2015), who established that participatory monitoring and evaluation has a significant effect on project success. Project sustainability was taken as one of the indicators for project success.

The findings of the study were also consistent with those Mwendamseke (2016), who established that project implementation without proper monitoring and evaluation processes leads to the collapse of projects. The study, conducted in Dodoma, Tanzania revealed that proper M&E ensured better management of the water supply services and improved project technical support.

Moreover, the findings also concur with those of Umugwaneza and Kule (2016) who conducted a study in Rwanda and established that monitoring and evaluation is essential in project management and accounts for about ninety-eight percent of the variations in project sustainability.

With regard to managerial assessment, the findings of this study agree with those of Siriwardhane and Taylor (2017), who examined the accountability of local government assets in Australia. Their findings revealed that managerial accountability is necessary since public assets have no profit-maximization objective, managers have to be accountable for resource utilization. The findings of the study also matched those of Akhter and Dey (2017) who established that transparency is perceived to boost the performance of projects and organizations in general, and is a core tenet of accountability.

Conclusions

In order to achieve Kenya's Vision of transforming the country to middle-income status by the year 2030, there is a need for a thriving water sector. The onus is on the water sector stakeholders to ensure the sustainability of available water supply sources given the water scarcity trends. Urban informal settlement areas are faced with unique challenges owing to huge population densities that have generated infrastructural and spatial challenges. These areas are also hubs for informal economic activities that are a key contributor to the country's economic growth. The water projects, which form the life-blood of these activities, must, therefore, be sustainably managed. It is imperative for water sector stakeholders in the urban informal settlement space to adopt a sustainability mindset right from the project initiation stage. This calls for a clear focus on the results (short, medium, and long term) that these projects are envisaged to achieve. By focusing on the results chain, the stakeholders will be better placed to put in place measures that enhance sustainability, which is one of the results of good project management practices.

First, there is a need to put in place project accountability measures. Given that water is a merit good and public projects are not required to make profits, it is essential to assess regularly if the projects are achieving their objectives. Accountability is three-pronged entailing project evaluation, managerial assessment, and transparency.

Monitoring and evaluation is at the center of project management best practice since it serves as a way of reflecting on project performance and steering projects back on course where need be. Managerial assessment is also important since project leaders have to be held to account for the use of public resources. Transparency ensures that there is full disclosure of pertinent project information to the key stakeholders.

Recommendations

The findings of this study form the basis of several recommendations for policy and practice. Water sector stakeholders implementing projects in informal settlement areas should invest in accountability structures to ensure sustainability. This calls for strengthening monitoring and evaluation practices in the projects. Evaluations should be carried out on a regular basis and preferably involving external consultants for objectivity. Participatory evaluation is also highly recommended. Since M&E can be quite tasking and resource-consuming, planning for M&E should be done immediately after project design and not merely as an afterthought.

Further, as much as these projects are situated in informal areas, there is a need to strengthen managerial performance through regular assessment by project sponsors and technical assistants. Disciplinary actions should be enforced in situations where managerial performance is found unsatisfactory. This will go a long way in curtailing the 'water supply cartels' that are quite prevalent in these areas. Transparency with regard to project information should also be observed to enhance the accountability of the project implementation team to stakeholders.

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