



**PROJECT MANAGEMENT PROCESS AND SUSTAINABILITY OF WATER AND SANITATION PROJECTS BY ATHI
WATER WORKS DEVELOPMENT AGENCY IN NAIROBI CITY COUNTY**

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Accepted: November 4, 2024

DOI: <http://dx.doi.org/10.61426/sjbcv11i4.3153>

ABSTRACT

In Kenya, despite access to safe water and improved sanitation being a constitutional right, inadequacy of water and sanitation services remain a major problem confronting many people in the country. The sustainability of WASP is therefore questionable which makes it necessary to interrogate project management process in WASP and its ability to ensure sustainability of the projects. This study therefore interrogated how project management process influences sustainability of WASP focusing on the projects by Athi Water Works Development Agency. This was with the intent of assessing how project planning, resources allocation, stakeholders' involvement and monitoring and evaluation influence sustainability of WASP in Athi Water Works Development Agency in Nairobi City County. The investigation was based on descriptive survey research design, covering 17 completed WASP within Nairobi City County. The census approach was applied where all the 17 projects were covered. A questionnaire was administered to 39 staffs in AWWDA including the chief executive officer (C.E.O), departmental managers, divisional managers and head officers (in charge of the technical operations in the divisions). Qualitative and quantitative analytical methods were employed to analyze the data, and the results presented in tabulated form, graphs and pie charts and interpreted accordingly. Findings revealed that project planning, stakeholders' involvement, and monitoring and evaluation have significant positive effect on project sustainability. However, resources allocation was found to have insignificant effect on project sustainability. The study recommends among other measures that AWWDA should keep up the good project planning and it must relook into how resources allocation in the projects is managed to ensure that the same is done in such a manner that it actually benefits the project and hence the project beneficiaries for improved sustainability.

Key Words: Project Planning, Resources Allocation, Stakeholders' Involvement, Monitoring and Evaluation

CITATION: Mogesi, W. Z., & Gachengo, L. (2024) Project management process and sustainability of water and sanitation projects by Athi Water Works Development Agency in Nairobi City County. *The Strategic Journal of Business & Change Management*, 11 (4), 1247 – 1264. <http://dx.doi.org/10.61426/sjbcv11i4.3153>

INTRODUCTION

Project sustainability over the past decade has gained a wide cognition as a fundamental aspect in most fields such that focus is no longer just on the economic outcome of the projects. Consequently, firms have been subjected to heightened pressure so that the projects undertaken not only meet their performance goal to the shareholders based on economic perspective alone, but that they attain sustainability in their performance that is vital for the satisfaction of all stakeholders (Michaelides, Bryde & Ohaeri, 2014). Emphasizing on this, Chawla et al. (2018) underscores that the achievement of long term benefits of development projects within the constraints of uncertainties and shortage of natural resources, sustainability issues needs to be largely considered and addressed accordingly in projects in every field.

According to the 2019 world water development report by the United Nations, global demand for water and sanitation supply has been on the rise since 1980s due to a myriad of factors including population growth and socio-economic developments. The report underscores that the demand is likely to continue rising all through to 2050 due to the growing demand in both domestic and industrial sectors. It also highlights the scarcity and stress in water and sanitation services where it indicates that roughly 4 billion people globally experience acute water scarcity at least 30 days in a year with 3 out of 10 people lacking accessibility to safe drinking water. In addition, 6 out of 10 people globally lack access to safe sanitation services with 1 person out of 9 practicing open defecation (UNESCO, 2019). The paradox is that billions of dollars have been spent in WASP over the years in efforts to solve the problem. The problem has been blamed on the projects not been sustainable whereby, 35% to 50% of WASP often fail few years after their completion (Water for Life Rating, 2015).

In Africa, poor sustainability of WASP has resulted into scarcity of water and sanitation services across the region. A 2011 survey of 23 water projects in 6 sub-Saharan countries (Nigeria, Ghana, Tanzania,

Benin, Burkina Faso and Angola) funded by the European Community sought to determine if the projects had yielded sustainable results. It revealed that less than 50% of them were meeting the beneficiaries' needs and indicated that most of the projects would not deliver benefits in the long term due to institutional weaknesses – inadequate capacity to operate and maintain the installed equipment (European Court of Auditors, 2012). Thus, periodic and extreme water scarcity is still a major challenge which is further compounded by the growing population and their agrarian economies which largely use groundwater, and this has led to many aquifers being depleted. In 2015, only 28% of sub-Saharan population had access to basic sanitation services while just 24% had access to safe drinking water (WHO/UNICEF, 2017). Between 2000 and 2017, the World Health Organization (WHO) reported that most the countries that recorded an increase in the number of people practicing open defecation due to lack of proper sanitation were in Sub-Saharan Africa (UNICEF and WHO, 2019).

Within the context of project management, sustainability is defined as harmonization of the project with the needs of the institution and the stakeholders in such a manner that the current and future stakeholders' needs are fulfilled (Hallstedt, 2017). Sustainability has become a fundamental aspect for consideration in project management. The issue of sustainability ought to be factored across the entire stages of project management including planning, scheduling, execution as well as completion. This entails taking into account the benefits to accrue to the client, the community and the environment (Habibi *et al.*, 2018). The implementer of the project should take these issues into account to ensure the project is successful in the long run (Aaltonen and Kujala, 2010)

Project management process is the planning and implementation of a series of activities in such a flow to ensure that they are achieved in a specified timeline within a limited budget (Project Management for Development Organizations,

2015). There are many activities in project management process but some of them are common in diverse projects for the achievement of project sustainability. These include planning, resources allocation, stakeholders' involvement and monitoring and evaluation (Kuria & Wanyoike, 2016; Pourrastam & Ismail, 2011). On planning, its fundamental importance is rooted in the fact that planning sets out the deliverables for the project to achieve and how the same will be achieved, which if lacking will culminate into the entire project failing (Pinto, 2013).

The Kenyan government has been making efforts to invest in water and sanitation projects in their bid to enhance accessibility to water as well as sanitation services even to the marginalized but as Origa (2019) highlights, nearly two third of them almost malfunction after 3 to 5 years of completion. This varies across different counties and it is therefore important to interrogate the sustainability of WASP in by different institutions in the different counties. This research focused on Nairobi City County where the assessment was on water and sanitation projects by Athi Water Works Development Agency (AWWDA).

Statement of the Problem

Sustainability of water and sanitation projects is a concern particularly in developing countries where limited (Chiluba, 2019). It has been estimated that 35% to 50% of WASP often fail few years after their completion (Water for Life Rating, 2015). This is despite the massive investment of resources by governments in water and sanitation projects in efforts to enhance accessibility to quality water and sanitation services. This is evident in Kenya whereby, Origa (2019) estimates that nearly a third of water projects are not functional at any particular time with two third of the projects malfunctioning 3 – 5 years after completion. This could explain the paradox that while access to safe water and improved sanitation is a basic Constitutional right under Article 43 and a major target for Vision 2030, it is actually estimated that by 2030 poor accessibility to water and sanitation

services is likely worsen than it is currently (Development Initiatives, 2018). This raises the questions: is project management process in WASP geared towards sustainability? How is project management process influencing the sustainability of the projects and what needs to be improved?

In Kenya, Muthoni and Karanja (2019) analyzed how project management practices influenced sustainability of urban based housing projects in the country. Their findings however cannot be applied to the case of WASP which are quite different from the urban based housing projects. Musau and Kirui (2018) only covered Machakos County while focusing on the impact on the project implementation and not the projects' sustainability. Thus, the results are unreliable to WASP in Nairobi. Apparently therefore, as evident in the reviewed studies above, past studies in project management lacks sufficient insights on how project management process influence sustainability of WASP in Nairobi City County. As such, while the need to streamline project management process for the purpose of sustainability in WASP is evident, there is no sufficient empirical insight to inform this due to inadequacy in existing studies. This study therefore sought to contribute some useful empirical insights to help in addressing this inadequacy of the existing studies by interrogating how project management process influences sustainability of WASP focusing on the projects by AWWDA in Nairobi City County.

Objectives of the Study

Generally, this research was to interrogate how project management process influences sustainability of WASP within Nairobi County. The research particularly focused on achieving the following objectives:

- To assess the influence of project planning on sustainability of water and sanitation projects by AWWDA in Nairobi City County
- To examine the impact of resources allocation on sustainability of water and sanitation projects by AWWDA in Nairobi City County

- To evaluate the influence of stakeholders' involvement on sustainability of water and sanitation projects by AWWDA in Nairobi City County
- To analyze the influence of monitoring and evaluation on sustainability of water and sanitation projects by AWWDA in Nairobi City County

LITERATURE REVIEW

Theory of Project Management

The theory of management according to Koskela and Howell (2002) underscores that in managing the project, three ingredients are key including planning, execution and control. Planning entails developing, revising and implementing plans for executing the project tasks. On execution, the theory advocates for a two-way communication as opposed to top-down communication during the implementation of tasks. Control entails checking for reasons behind any deviation and addressing the reasons as opposed to focusing on changing the project performance level to achieve the set goal in case of deviations. These tenets provide significant insights that were applied in this study to interrogate project planning, stakeholders' involvement and monitoring and evaluation.

Resource Dependence Theory

The origin of the idea in resource dependence theory is linked to the social exchange theories by Blau (1964) and Emerson (1962). However, the full articulation of the theory was by Pfeffer and Salancik (1978). According to the theory, organizations obtain resources from the very environment that other organizations are seeking for the very resources. This creates an uncertainty around resources availability, concentration and interdependence (Zehir *et al.*, 2018). This makes resources allocation very critical in the context of project management.

According to Pfeffer and Salancik (1978), resources allocation has to be controlled to minimize uncertainties around the fundamental resources

through adjustment of structures and processes based on three factors: significance of the resource, the firm's discretion allocating and using it in a given project and the availability of substitute or alternatives. Thus, effective resource allocation may be accomplished by identifying substitute resources and diversifying resource supply. This theory provides important insights in explaining resources allocation in a project and therefore, it was used to assess resource allocation in water and sanitation projects.

Sustainable Development Theory

The origin of sustainable development (SD) theory is traced to ideas in the classical philosophy "*Heaven and People in One*" in 1100 – 771 B.C. in China when the emperors recognized the necessity to avoid overexploiting natural resources (including rivers and forests), but rather ensure they are rationally used and protected (Wu *et al.*, 2014). However, it was in the monograph of Carlowitz "*Afforestation and Economy*" in 1713 that the term "sustainability" was first used (Varro, 1954). In this early period of the evolution of the sustainable development theory, it emphasized on using natural resources in such a rational manner that they are not overexploited.

The contemporary SD theory articulates that sustainability in a development project is based on four types of resources and their interconnectivity in a given period. These include natural capital, human capital, manufactured capital and social capital (Ekins, Dresner & Dahlstrom, 2008). These forms of capital together with their interconnectivity in a development project results into a weak, strong or abnormally strong sustainability. A weak sustainability is where the cumulative natural capital and manufactured capital are considered the most critical (Williams & Millington, 2004). Thus, if manufactured capital greatly increases at the expense of the natural capital been degraded, the project is considered sustainable as long as the total capital has increased (Wilson & Wu, 2017).

Empirical Literature Review

Project Planning and Sustainability of Projects

Mulwa (2013) in a study on the factors influencing sustainability of water projects in Machakos County revealed that project planning was a factor that influenced water projects' sustainability. This was based on an investigation of 5 water projects where data was obtained from 75 respondents and analyzed using frequencies, percentages and correlation analysis. The analysis was however shallow and insufficient to generate comprehensive findings and generate reliable inferences. The current study applied a detailed analysis involving not just frequencies, percentages and correlation, but also measures of central tendency (the mean in particular) and measures of dispersion (particularly standard deviation), as well as regression analysis for comprehensive findings.

Resources Allocation and Sustainability of Projects

Mrangu (2018) in an investigation on factors that affects sustainability of community based projects in Tanzania revealed that resources allocation was a critical factor that affected project sustainability. The researcher used the descriptive survey design to carry out the study using quantitative method for data collection and analysis. However, the study assessed the effect of resources allocation as a general construct without disintegrating it into the specific resources allocated to assess how allocation of the specific resources was critical in sustainability. The findings are therefore inconclusive in explaining the influence of resources allocation on project sustainability. In measuring the resources allocation construct, the current study therefore considered the allocation of specific resources (including human resources, financial resources and physical resources) towards sustainability achievement for more comprehensive findings.

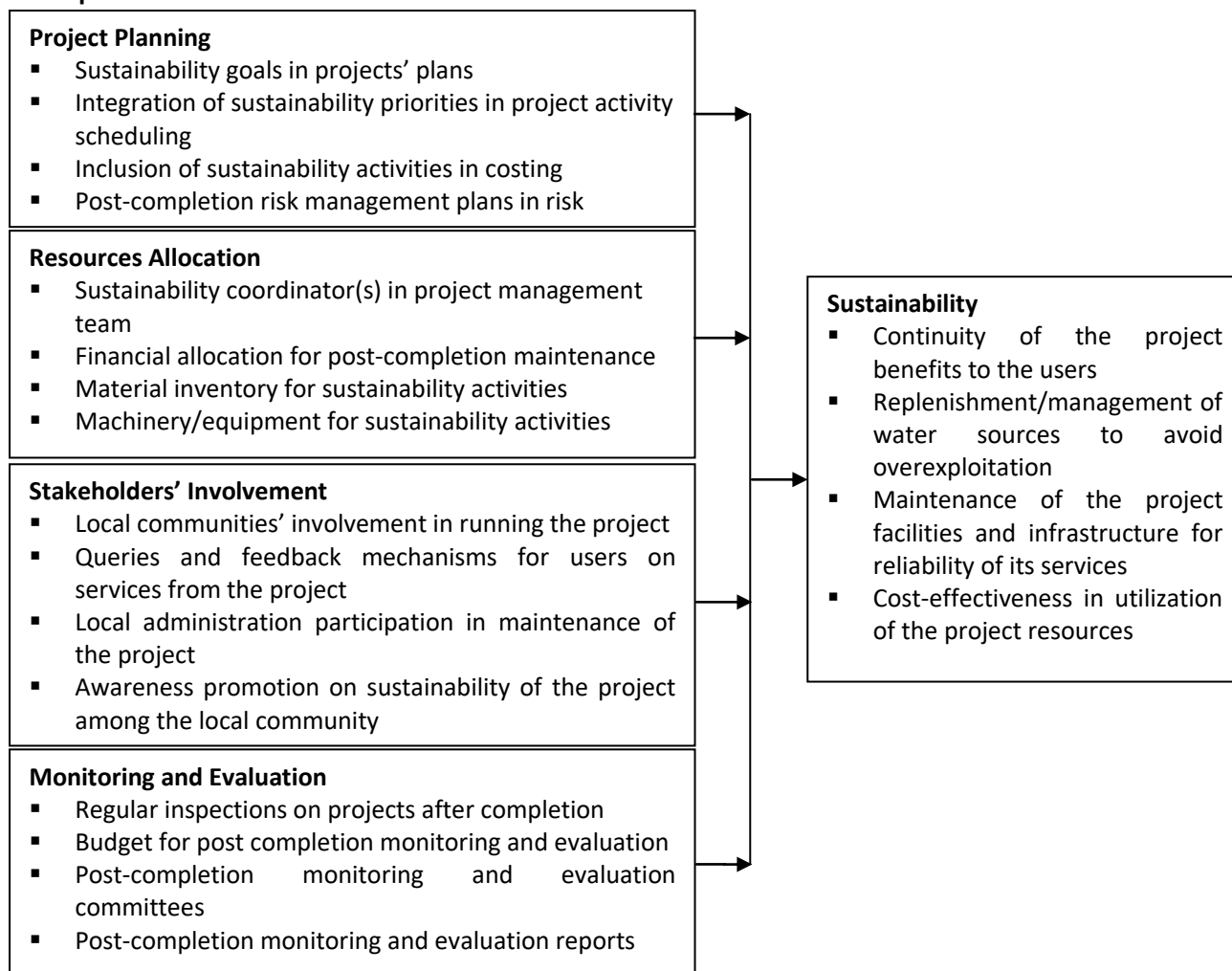
Stakeholders' Involvement and Sustainability of Projects

Ochunga and Awiti (2017) did a research to determine how stakeholders' involvement influences community development projects' sustainability in Homa Bay, Kenya. Quantitative methodology was used where a survey targeting 153 respondents from 51 institutions partnering with Plan International. The results revealed passive stakeholder's involvement significantly influence sustainability of community development projects negatively while interactive stakeholders' involvement significantly affected positively, sustainability of the projects. However, management of stakeholders' involvement in community development projects by projects by Plan International may not be necessarily the same as in the case of water and sanitation projects by AWWDA. Therefore, the effect of stakeholders' involvement may not be the same in the projects by the two organizations.

Monitoring and Evaluation and Sustainability of Projects

Gathege and Yusuf (2019) interrogated how monitoring and evaluation affected sustainability of women based agricultural projects in Uasin Gishu County. They applied the descriptive survey design where 219 women based agricultural projects were targeted. 116 participants from the sub-county governments selected through stratified random sampling were engaged by their responding to questionnaire and interview schedule. Upon quantitatively analyzing the data, results revealed monitoring and evaluation significantly affected sustainability of projects. Nonetheless, the indicators used to measure sustainability (food yield increment, farming practices enhancement and farmers empowerment) cannot measure WASP sustainability.

Conceptual Framework



Independent Variables

Dependent Variable

Figure 1: Conceptual framework

Source: Author (2021)

METHODOLOGY

For this study, descriptive survey research design was applied. The target population was the completed water and sanitation projects undertaken by Athi Water Works Development Agency within Nairobi City County. A total of 17 water and sanitation projects by the Agency completed by 2016 in Nairobi City County (AWWDA, 2020) were studied.

The study applied the census approach where all the 17 projects were considered. Respondents targeted included the chief executive officer (C.E.O), departmental managers, divisional managers as

well as head officers (in charge of the technical operations in the divisions). Thus, the study targeted a total of 39 respondents.

A structured questionnaire was used, being considered the best for this study due to its ability to mitigate the financial resources constraints and the limited time constraint in carrying out the research.

2 completed projects by AWWDA in Kiambu County were selected for the pilot study. These include Theta dam project and Thika-Juja sewers expansion project. The questionnaire was issued a total of 5 respondents randomly selected among the management staffs at AWWDA for the pilot

study. Cronbach's alpha was applied in this study to test and ensure reliability of the questionnaire.

Quantitative data was analyzed in two phases after coding and entering it into SPSS. In the first phase, the researcher computed the frequencies, percentages and mean for different datasets for the different variables. In the second phase (inferential statistics phase), the researcher tested the relationship between variables using correlation and regression analysis.

Prior to regression analysis however, diagnostic tests were done to check the suitability of the data to be analyzed by regression analysis. In this regard, normality test and multicollinearity test were done.

FINDINGS AND DISCUSSION

Response Rate

The researcher targeted to include 39 respondents in the study comprising of the chief executive officer (C.E.O), departmental managers, divisional managers as well as head officers (in charge of the technical operations in the divisions). However, while 22 of the targeted respondents duly filled the

questionnaires, 17 did not respond to the questionnaires. Thus, the response rate was equivalent to 56.4%. Although scholars have not reached consensus on acceptable response rate, an analysis of several studies by Sataloff and Vontela (2021) revealed that the minimum adequate response rate recommended ranges between 40% and 75%. Therefore, in this regard, the response rate achieved in this study (56.4%) is adequate.

Descriptive Statistics Analysis

In line with the study objectives, various aspects of project management process in AWWDA were assessed as well as the sustainability of the water and sanitation projects by the Agency. To assess each of the aspects, a set of statements expressing the aspect in an affirmative state were presented to the respondents. The respondents indicated their agreement or disagreement with the statements on a scale of 1-5 whereby 1 and 2 expressed disagreement, 4 and 5 expressed agreement while 3 indicated a neutral position (neither agree or disagree). The responses were analyzed by computing percentage, mean and standard deviation (std. dev).

Project Planning in Projects by AWWDA

Table 1: Project planning in WASP

Statement	1	2	3	4	5	Mean	Std dev
a) Sustainability goals were factored in the completed projects' plans before their implementation	-	-	4.5	27.3	68.2	4.64	0.58
b) Sustainability priorities were considered when scheduling for the various project activities undertaken	-	-	4.5	36.4	59.1	4.55	0.60
c) Costing was carefully and adequately done including sustainability activities for the completed projects before its implementation	-	-	22.7	36.4	40.9	4.18	0.80
d) The scope for the different project activities clearly defined post-completion activities before the completed projects were even implemented	-	4.5	22.7	31.8	40.9	4.09	0.92
e) Post-completion risk management was included in risk mapping for the completed projects before their implementation	-	4.5	4.5	45.5	45.5	4.32	0.78
Average						4.35	0.73

Source: Research data (2023)

The overall rating for project planning in AWWDA averaged at a mean of 4.35 with a low Std dev of 0.73. This reflects respondents' agreement with most of the statements implying good project planning in AWWDA. The low std dev is an indication that there were minimal deviations in the responses from the mean rating. In particular, respondents strongly concurred that sustainability goals were factored in the completed projects' plans before their implementation (mean= 4.64, std dev= 0.58). Similarly, they strongly agreed that sustainability priorities were considered when scheduling for the various project activities undertaken (mean= 4.55, std dev= 0.60).

Most of the respondents were in agreement that post-completion risk management was included in risk mapping for the completed projects before their implementation (mean= 4.32, std dev= 0.78). They equally concurred that the scope for the different project activities clearly defined post-completion activities before the completed projects were even implemented (mean= 4.09, std dev= 0.92), while asserting that costing was carefully and adequately done including sustainability activities for the completed projects before its implementation (mean= 4.18, std dev= 0.80).

Resources Allocation in Projects by AWWDA

Table 2: Resources allocation in WASP

Statement	1	2	3	4	5	Mean	Std dev
a) The project management teams included sustainability coordinator(s) who are still coordinating sustainability matters for the completed projects	-	13.6	13.6	45.5	27.3	3.86	0.99
b) There was adequate financial allocation for post-completion maintenance for most of the projects	13.6	18.2	13.6	27.3	27.3	3.36	1.43
c) There is adequate material inventory for sustainability activities for the completed projects	-	-	22.7	50.0	27.3	4.05	0.72
d) The machinery and equipment for undertaking the required sustainability activities for the completed projects are readily available	4.5	4.5	22.7	40.9	27.3	3.82	1.05
Average						3.77	1.05

Source: Research data (2023)

On resources allocation, the respondents' overall rating averaged at a mean of 3.77 implying that most of them were in agreement with the statements. However, the relatively high overall standard deviation (1.0) indicates the presence of considerable variations from the mean in the responses to the statements. As evidenced by the highest mean of 4.05 with low std dev of 0.72, majority of the respondents concurred that there is adequate material inventory for sustainability activities for the completed projects. Although most of them agreed that the project management teams included sustainability coordinator(s) who are still coordinating sustainability matters for the

completed projects (mean= 3.86, std dev= 0.99), 13.6% disagreed with an equivalent proportion expressing a neutral position on the same.

Similarly, whereas, majority were in agreement that the machinery and equipment for undertaking the required sustainability activities for the completed projects are readily available (mean= 3.82), there were notable contrary opinions as implied by the high std dev of 1.05 with 22.7% of the respondents maintaining a neutral position on the same. On the statement that there was adequate financial allocation for post-completion maintenance for most of the projects, respondent expressed highly divergent views as indicated by the mean of 3.36

with a high standard deviation of 1.43. While 27.3% agreed, 18.2% disagreed with 13.6% maintaining a neutral position.

Table 3: Stakeholders' involvement in WASP

Statement	1	2	3	4	5	Mean	Std dev
a) Local communities are involved in running the completed projects	9.1	-	9.1	36.4	40.9	3.86	1.46
b) There are sufficient mechanism for users to raise queries and give feedback on the services they are getting through the projects	-	4.5	-	36.4	54.5	4.27	1.20
c) Local administration is involved in maintenance of the completed projects	-	4.5	4.5	31.8	54.5	4.23	1.23
d) The Agency promotes awareness on sustainability of the project among the local community members	-	-	13.6	13.6	68.2	4.36	1.22
Average						4.18	1.28

Source: Research data (2023)

Concerning stakeholders' involvement, ratings averaged at a mean of 4.18 which implies respondents' agreement with most of the statements. Even so, the high overall standard deviation of 1.28 is an indication that there were notable variations from the mean in the responses. Majority of the respondents unanimously agreed that the Agency promotes awareness on sustainability of the project among the local community members (mean= 4.36). Similarly, a vast

majority concurred that there are sufficient mechanism for users to raise queries and give feedback on the services they are getting through the projects (mean= 4.27, std dev= 1.20). It was further affirmed that local administration is involved in maintenance of the completed projects (mean= 4.23, std dev= 1.23), while local communities are involved in running the completed projects (mean= 3.86, std dev= 1.46).

Monitoring and Evaluation of Projects by AWWDA

Table 4: Monitoring and evaluation in WASP

Statement	1	2	3	4	5	Mean	Std dev
a) There are regular inspections on projects after their completion	-	4.5	9.1	13.6	72.7	4.55	0.86
b) There are budgets for post completion monitoring and evaluation of the projects	4.5	4.5	18.2	22.7	50.0	4.09	1.15
c) We have committee(s) for post-completion monitoring and evaluation of the projects	-	-	27.3	22.7	50.0	4.23	0.87
d) Post-completion monitoring and evaluation reports are usually prepared to guide sustainability improvement for the projects	-	-	13.6	40.9	45.5	4.32	0.72
Average						4.30	0.90

Source: Research data (2023)

Monitoring and evaluation was rated at a mean of 4.30 with a low standard deviation of 0.90. This is

an indication that the respondents agreed with the statements on monitoring and evaluation with

minimal variations in the responses from the mean. Respondents strongly asserted that there are regular inspections on projects after their completion (mean= 4.55, std dev= 0.86). They affirmed that post-completion monitoring and evaluation reports are usually prepared to guide sustainability improvement for the projects (mean=

4.32, std dev= 0.72). Besides, there are committees for post-completion monitoring and evaluation of the projects (mean= 4.23, std dev= 0.87) as well budgets for post completion monitoring and evaluation of the projects (mean= 4.09, std dev= 1.15).

Sustainability of Water and Sanitation Projects by AWWDA

Table 5: Project sustainability in WASP

Statement	1	2	3	4	5	Mean	Std dev
a) Users have been continuously enjoying the benefits of our completed water and sanitation projects over the years since their completion with minimal interruptions	4.5	-	-	40.9	54.5	4.41	0.91
b) The services of our completed projects are reliable and adequate to the users in all seasons throughout the year	-	-	9.1	36.4	54.5	4.45	0.67
c) We have been taking measures to protect the overexploitation of the water sources of our projects and ensure their replenishment	-	-	9.1	27.3	63.6	4.55	0.67
d) We ensure that our projects are run in a manner that ensures minimal environmental pollution and destruction	-	-	4.5	27.3	68.2	4.64	0.58
e) We have adequately trained technicians within the localities cross-cut by our projects to ensures smooth repair and maintenance of the project facilities and infrastructure	-	-	9.1	45.5	45.5	4.36	0.66
f) The equipments and materials needed for maintenance of the project facilities and infrastructure are readily available	-	-	18.2	40.9	40.9	4.23	0.75
g) The tariffs charged on users for the services our completed water and sanitation projects are consumer friendly	-	-	4.5	36.4	54.5	4.32	1.13
h) The completed water and sanitation projects are run in a very cost-effective manner	-	4.5	9.1	31.8	54.5	4.36	0.85
Average						4.41	0.78

Source: Research data (2023)

On sustainability of the projects by AWWDA, the average rating was a mean of 4.41 with a standard deviation of 0.78. This is an indication that respondents were in agreement with most of the statements with the low standard deviation indicating that responses did not differ much from the mean. The respondents strongly asserted that the agency ensures that their projects are run in a manner that ensures minimal environmental pollution and destruction (mean= 4.64, std dev= 0.58). There was also a strong affirmation that they have been taking measures to protect the overexploitation of the water sources of our

projects and ensure their replenishment (mean= 4.55, std dev= 0.67).

The respondents further asserted that the services of the completed projects are reliable and adequate to the users in all seasons throughout the year (mean= 4.45, std dev= 0.67). They concurred that users have been continuously enjoying the benefits of the completed water and sanitation projects over the years since their completion with minimal interruptions (mean= 4.41, std dev= 0.91).

It was revealed that the Agency has adequately trained technicians within the localities cross-cut by their projects to ensures smooth repair and

maintenance of the project facilities and infrastructure (mean= 4.36, std dev= 0.66). Moreover, the respondents attested that completed water and sanitation projects are run in a very cost-effective manner (mean= 4.36, std dev= 0.85). They asserted that the tariffs charged on users for the services our completed water and sanitation projects are consumer friendly (mean= 4.32, std dev= 1.13) and that the equipments and materials needed for maintenance of the project facilities and infrastructure are readily available (mean= 4.23, std dev= 0.75).

Correlation Analysis

Correlation between the dependent variable (project sustainability) and each of the independent variables (project planning, resources allocation, stakeholders' involvement, and monitoring and evaluation) was assessed based on Pearson's correlation coefficient (r). The significance of the correlations was tested at 95% confidence level (significance level= 0.05). Table 6 presents the findings.

Table 6: Correlation between variables

		Project planning	Resources allocation	Stakeholders involvement	Monitoring and evaluation	Project sustainability
Project planning	Pearson Correlation	1				
	Sig. (2-tailed)					
Resources allocation	N	22				
	Pearson Correlation	.365	1			
Stakeholders involvement	Sig. (2-tailed)	.094				
	N	22	22			
Monitoring and evaluation	Pearson Correlation	.375	.394	1		
	Sig. (2-tailed)	.081	.070			
Project sustainability	N	22	22	22		
	Pearson Correlation	.522	.583	.430	1	
	Sig. (2-tailed)	.103	.401	.246		
	N	22	22	22	22	
	Pearson Correlation	.844**	-.166	.745**	.446*	1
	Sig. (2-tailed)	.000	.461	.000	.038	
	N	22	22	22	22	22

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

* . Correlation is significant at the 0.05 level (2-tailed).

Source: Research data (2023)

Correlation between project planning and project sustainability was the highest at $r = 0.844$. The correlation is significant since the p-value (sig.= 0.000) is less than 0.05. This implies that project planning has a strong positive correlation with project sustainability. This is an indication that it is probable to increase water and sanitation projects' sustainability by enhancing project planning. The findings agree with Mustafa (2016) who found that good project planning positively affect project sustainability.

However, the correlation between resources allocation and project sustainability was weak (-0.166) and insignificant ($0.05 < p\text{-value} = 0.461$). This indicates that increasing resources allocation may not have significant impact on sustainability of water and sanitation projects. The findings differ from the findings by Mrangu (2018) that found that resources allocation was a critical factor that affected project sustainability.

The correlation between stakeholders' involvement and project sustainability was the second highest at $r = 0.745$. The correlation was significant given that

its p-value (sig.= 0.000) is less than 0.05. The results therefore mean that stakeholders' involvement and project sustainability have a strong positive correlation. This implies that improvement of stakeholders' involvement in water and sanitation projects may enhance the projects' sustainability. The findings are congruent with Ochunga and Awiti (2017) whose study also found that stakeholder's involvement significantly influenced sustainability of community development projects.

Similarly, monitoring and evaluation was found to have a significant correlation with project sustainability since its p-value (0.038) is less than 0.05. However, the correlation is relatively weak ($r=0.446$) compared to project planning ($r=0.844$) and stakeholders' involvement ($r=0.745$). The findings imply that enhancing monitoring and evaluation in water and sanitation projects may significantly improve the projects' sustainability but the impact would be less than when project planning or

stakeholders' involvement is enhanced. The findings nonetheless concur with Njeri and Omwenga (2019) who revealed monitoring and evaluation planning have a significant positive impact on sustainability of projects.

Regression Analysis

Multiple linear regression analysis was done to estimate the model for the relationship between the dependent variable and the dependent variables. Diagnostic tests were first done to ensure that the key assumptions of linear regression analysis were not violated.

Diagnostic Tests

The main diagnostic tests done included the normality test and multicollinearity test. Linear regression analysis requires that the data used should have a normal distribution and this was checked through the normality test whose results were as presented in Table 7.

Table 7: Normality test results

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Project planning	.155	22	.180	.919	22	.073
Resources allocation	.112	22	.200*	.943	22	.227
Stakeholders involvement	.257	22	.001	.678	22	.070
Monitoring and evaluation	.220	22	.007	.842	22	.062
Project sustainability	.164	22	.129	.886	22	.106

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Research data (2023)

The normality test was based on Shapiro-Wilk test. The results affirmed that there was normal distribution in the data as reflected by the Shapiro-Wilk statistic values whose p-values (Sig.) were greater than 0.05. According to Field (2009), the Shapiro-Wilk test statistic indicates a normal distribution when the p-value is at least 0.05 or more.

Linear regression also requires that there should be no multicollinearity in the data. That is, there should be negligible correlation among the independent variables. This was tested by use of the variance inflation factor (VIF) test. The test results were as presented in Table 8.

Table 8: Multicollinearity test results

	Collinearity Statistics	
	Tolerance	VIF
Project planning	.406	2.463
Resources allocation	.633	1.579
Stakeholders involvement	.441	2.268
Monitoring and evaluation	.550	1.817

a. Dependent Variable: Project sustainability

Source: Research data (2023)

The multicollinearity test results indicated that the VIF for project planning, resources allocation, stakeholders' involvement and monitoring and evaluation were 2.463, 1.579, 2.268 and 1.817 respectively. According to Dhakal (2018), if the VIF is 10 or more, there is a significant correlation

between the independent variables hence existence of multicollinearity problem in the data. In this regard therefore, there was no multicollinearity problem because the VIF for all the independent variables was less than 10.

Regression Model

Table 9: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F	df1	df2	
1	.890 ^a	.793	.744	.29103	.793	16.262	4	17	.000

a. Predictors: (Constant), Monitoring and evaluation, Stakeholders involvement, Resources allocation, Project planning

Source: Research data (2023)

From the model summary, R square was 0.793. This means that 79.3% of changes in project sustainability are determined by the predictors (independent variables) which include project planning, resources allocation, stakeholders' involvement and monitoring and evaluation. The remaining 20.7% of the changes are explained by other factors.

The ANOVA results were analyzed to determine the significance of the estimated regression model in explaining the relationship between the dependent and the independent variables. Table 10 presents the ANOVA results.

Table 10: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.510	4	1.377	16.262	.000 ^b
	Residual	1.440	17	.085		
	Total	6.950	21			

a. Dependent Variable: Project sustainability

b. Predictors: (Constant), Monitoring and evaluation, Stakeholders involvement, Resources allocation, Project planning

Source: Research data (2023)

From the ANOVA statistics, the F-value was 16.262 whose p-value was 0.000. This means that the F-value was significant since the p-value was less than 0.05. Therefore, the results indicate that the estimated regression model is significant in describing the effect of the independent variables (predictors: project planning, resources allocation,

stakeholders' involvement and monitoring and evaluation) on the dependent variable (project sustainability).

To estimate the regression model, the regression coefficients were scrutinized. Table 11 presents the findings.

Table 11: Regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.133	.570		1.989	.063
	Project planning	.661	.182	.630	3.637	.002
	Resources allocation	-.196	.100	-.273	-1.968	.066
	Stakeholders involvement	.172	.086	.331	1.992	.049
	Monitoring and evaluation	.098	.110	.134	.899	.038

a. Dependent Variable: Project sustainability

Source: Research data (2023)

The regression model was estimated as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + e$$

Y= project Sustainability, X_1 = project planning, X_2 = resources allocation, X_3 = stakeholders' involvement and X_4 = and monitoring and evaluation. β_0 = intercept, and β_1 , β_2 , β_3 , and β_4 are regression coefficients for their respective X variables, while e is error term.

Thus, using the regression coefficients derived, the estimated regression model was:

$$Y = 1.133 + 0.661X_1 - 0.196X_2 + 0.172X_3 + 0.098X_4$$

Project planning had a regression coefficient of 0.661 with a p-value of 0.002. The coefficient is significant because the p-value is less than 0.05. This means that when project planning in WASP is improved by 1%, the projects' sustainability will be improved by 66.1%. The findings support Alias, Isa and Samad (2014) whose study asserted that project planning was a very critical factor in ensuring the sustainability of a project.

The regression coefficient for resources allocation was -0.196 with a p-value of 0.066. The coefficient is insignificant since the p-value exceeds 0.05. This

means that resources allocation has insignificant effect on the sustainability of WASP. These findings disagree with the findings by Muchiri, Kinyanjui and Assumpta (2017) which indicated that resources allocation highly influence project sustainability.

For stakeholders' involvement, the regression coefficient was 0.172 with a p-value of 0.049. The p-value indicates that the coefficient is significant since it is less than 0.05. This therefore means that improving stakeholders' involvement in WASP by 1% is likely to significantly affect the projects' sustainability by 17.2%. The findings disagree with Ouma and Mburu (2017) which indicated no significant effect of stakeholders' involvement on project sustainability. However, the findings agree with Ochunga and Awiti (2017) whose findings revealed a significant positive influence of stakeholder's involvement on sustainability of projects.

Lastly, the regression coefficient for monitoring and evaluation was 0.098 with a p-value of 0.038. The coefficient is significant because the p-value is less than 0.05. This indicates that when monitoring and evaluation in WASP is increased by 1%, there is a possibility that the projects' sustainability will

improve by 9.8%. The results are in concurrence with Biwott, Ngeywo and Egesah (2017) who found that monitoring and evaluation is vital in ensuring project sustainability.

CONCLUSIONS AND RECOMMENDATIONS

Taking into account the study objectives and hence the research questions that this study sought to address, several conclusions were made from the research findings derived. First, the study concludes that project planning is a major aspect of project management process that significantly affects project sustainability positively. That is, through proper project planning, a project's sustainability can be significantly improved.

Similarly, the study concludes that stakeholders' involvement and monitoring and evaluation are critical aspects of project management process. Each of them just like project planning exerts a significant positive effect on project sustainability. This means that when there is good stakeholders' involvement in a project, the project is likely to be more sustainable. Likewise, when there is effective and efficient monitoring and evaluation in a project, the project's sustainability will be enhanced.

However, while it is doubtless that resources are necessary for project execution and completion, this study concludes that resources allocation does not significantly affect project sustainability. That is, increasing the allocation of resources for sustainability of a project would not cause a positive impact on project sustainability. Rather, it may cause an insignificant negative effect on the sustainability of the project.

The project management team in AWWDA should keep up the good project planning that is in place as revealed in the study findings. They should consider making it even better by having feasibility studies for planned projects conducted early enough and having all the relevant parties involved in the planning. This will help to ensure more efficient implementation and more sustainable projects since as revealed in the study, improvement in

planning is likely to cause a significant improvement in the project sustainability.

Although the study found that resources allocation has insignificant effect on project sustainability, this does not negate the importance of resources in a project. In reality, resources are indispensable in any project. The findings only imply that the way resources allocation is been done is not yielding significant positive benefits on the projects sustainability and even the little effect it generates is negative. Therefore, AWWDA must relook into how resources allocation in the projects is been managed and ensure that the same is done in such a manner that it actually benefits the project and hence the project beneficiaries for improved sustainability. Among the key measures they need to take is to ensure that there is adequate financial allocation for post-completion maintenance for all the projects and have strong internal control systems and structures to ensure that the allocations are not misappropriated.

While the study found that stakeholders' involvement by AWWDA in their projects is quite commendable, there is need to streamline it. In particular, they should consider improving the level of local communities' involvement in the running of the completed projects. Community/stakeholder engagements in all meetings in post project completion management should continue in various public forums. Such engagements must be geared towards ensuring that the local community consistently align themselves with the completed project requirements and emphasize on public ownership of the project while ensuring that the local community actually continues to benefit from the project.

On monitoring and evaluation, with the study findings having revealed significant but relatively weak positive influence on project sustainability, it is important that AWWDA consider streamlining the same in order to enhance its positive influence on project sustainability. The Agency should ensure that monitoring and evaluation of the projects is done as thorough as possible. The monitoring and

evaluation files for should include every detail about the project done by AWWDA so that any problem or potential problem can be identified, addressed according and the experience used to improve the implementation of future similar projects for better project sustainability. For this to be achieved, the agency can consider a neutral team to do the monitoring and evaluation of the completed projects and this could involve procuring a full monitoring and evaluation consultant to handle monitoring and evaluation during and post implementation.

Suggestions for Further Research

This research has provided substantial knowledge on project management process and how some of its aspects particularly project planning, resources allocation, stakeholders' involvement and monitoring and evaluation influences project

sustainability. However, since it covered only water and sanitation projects in Nairobi County by AWWDA, there is need for more similar research in different project contexts where more insights can be acquired and compared. This will help to enhance the knowledge on project management process and project sustainability in diverse project contexts.

It is necessary to also have more studies that will investigate the influence of other aspects of project management process on project sustainability, apart from those studied in this research (that is project planning, resources allocation, stakeholders' involvement and monitoring and evaluation). In this regard, other studies can investigate how other aspects like project risk management influences project sustainability.

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