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Project Management Practices and Performance of Water Projects in Makueni County, Kenya

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Abstract: **The population of Makueni County from the statistics shows that 35% are able to get fresh quality water, compared to national average of 60%. The study objective was to investigate the effects of management practices and water projects in Makueni County, Kenya. However, this research study sought to investigate the effect of project planning and project team building on water project performance in Makueni County, Kenya. Descriptive research design was used in this study. The study targeted 37 water projects in Makueni County. The unit of observation comprised of 3 project engineer and 2 site managers from each of the targeted water projects. The total target population was 185 project engineers and site managers. The sample size of this study was determined by use of Yamane formula (1967). The samples size was therefore 126 respondents. The study relied on primary data which was collected through use of questionnaires. Descriptive and Inferential statistic was used to analyse the quantitative data using the Statistical Package for Social Sciences (SPSS) version 26. The relationship between the dependent and independent variables was determined by Multivariate Linear regression. The research study concluded that project planning and project team building had significant positive effect on water project performance. This research, the results showed that Project Planning and Project Team Building were the major factors that affect the water projects and suggest the following recommendations: Project Planning in the water projects performance, study recommends that there is need where unforeseen expenses or budget overruns is managed promptly and effectively, the allocated budget matches the financial requirements of the water project, the WBS facilitates efficient assignment of responsibilities and allocation of resources and adjustments or improvements to the WBS are made as necessary during the project execution phase. This will enhance water projects performance in Makueni County. There is need to enhance Project Team Building in the performance of water projects. This research recommends the collective experience of the project team contributes positively to project planning and execution, also there is a need for the project team to receive adequate training to perform their roles effectively and the training provided is relevant and beneficial to the project's success. This will enhance the performance of water projects in Makueni County.**

Keywords: **Performance of Water Projects, Project Planning, Project Team Building.**

I. INTRODUCTION

Clean and water quality access is a fundamental human right and a critical component of sustainable development. Globally, water scarcity is a growing concern, exacerbated by population growth, urbanization, and climate change. According to the United Nations, more than 2 billion people live in countries experiencing high water stress. The increasing demand for water, coupled with the diminishing availability of fresh water resources, food security, and socio-economic development worldwide [2]. Effective water project management is critical in addressing these issues, ensuring that resources are utilized efficiently and that sustainable water supply systems are developed and maintained. It involves comprehensive planning, resource allocation, risk management, and stakeholder engagement to deliver water projects that meet the needs of communities while conserving the environment. By implementing robust project management practices, countries can enhance their capacity to cope with water scarcity, reduce vulnerabilities, and ensure the long-term sustainability of water resources for future generations [7].

The ultimate aim is to deliver a project that meets its goals efficiently and effectively, adhering to predefined quality standards while staying within the allocated time and budget constraints [9]. The project management process typically begins with the initiation phase, where the project's purpose, scope, and objectives are clearly defined. This phase involves conducting feasibility studies, identifying key stakeholders, and setting initial goals to ensure that there is viable and reliable project aligned with the organization's strategic objectives [10].

According to [8] shows that the cause of cost overruns and delays in construction projects in Africa especially in Ghana and Nigeria is due to lack of project management practices. According to [11] he acknowledged that communication is the key role in African projects. Most of the issues are management practices and they are engineered by factors like corruption, bad governors and labor which is Machinery, Man Power and also Materials. According to the Kenya National Water Services Strategy sustainable water access levels in Kenya were estimated to be at 60%, while sanitation was estimated at 68%. In Kajiado County, 50% of the water projects implemented were successfully completed. This indicates that various water projects face enormous challenges of implementation. The water projects performance projects in Makueni County have been a subject of concern due to several persistent challenges that hinder their effectiveness and sustainability. Despite concerted efforts by the government, non-governmental organizations, and international donors, these projects often face issues such as cost overrun and delays and poor quality of construction. One of the major issues affecting the water projects performance in Makueni County is project delays. Many water projects do not adhere to their original timelines, causing significant disruptions in the planned supply of water to the community.

A. Problem Statement

Many research studies conducted have brought many issues on practices in project management in water projects performance. [15] investigated significant investments and efforts by the government and various stakeholders to improve water infrastructure in Makueni County, Kenya, the performance of water projects remains suboptimal. Inadequate project management practices have showed that there are issues that cause cost overruns and delays causing very poor projects which are completed. These challenges have resulted in limited access to reliable and safe water for the residents of Makueni County [22]. From the statistics, the population of Makueni County shows that only 35% are able to access clean quality water, compared to the national average of 60% [16]. Furthermore, statistics from the Ministry of Water and Sanitation (2022) highlights that over 50% of water projects in the county experience significant delays, with some projects taking up to twice the planned duration to complete. Cost overruns are also prevalent, with an average increase of 30% over initial budgets, leading to financial strain on both government resources and donor funds. Very little study research had been done project management practices in performance of water projects in Makueni County in relation to Project planning and Project Team Building and how they influence the performance of water projects. It was against this background that the researcher was able to determine the effects of project management practices on water projects performance in Makueni County, Kenya.

B. Objective of the Study

The study objective of the research was to determine the influence of project management practices and performance of water projects in Makueni County, Kenya.

II. LITERATURE REVIEW

Successful completion of the project, the scope, objectives, timelines, resources and deliverables required are the key for the definition of project planning. It involves systematically organizing and outlining all necessary steps and activities that need to be undertaken to achieve specific goals within a predetermined timeframe and budget [20]. Project goals alignment defines the specific outcomes and objectives that the project aims to achieve. These goals provide clarity and direction, guiding all activities and decisions throughout the project lifecycle. [21].

The project budget allocation outlines the resources in financial distributed to execute the project. It includes estimates for costs related to personnel, materials, equipment, services, and any other expenses necessary to complete the project. Developing an accurate and comprehensive budget is crucial for financial planning and control throughout the project's duration.

A well-planned budget ensures that resources are utilized efficiently, helps to prevent cost overruns, and enables effective monitoring of expenditures. In relation to water projects in Makueni County, the budget might cover costs such as infrastructure construction, equipment procurement, community engagement activities, operational costs, and maintenance expenses over the project's lifecycle [9]. The WBS breaks down projects to small and achievable components, which facilitates detailed planning, resource allocation, scheduling, and monitoring. Each level of the WBS represents a progressively detailed description of the project deliverables and activities, enabling project teams to understand the interrelationships between tasks and their dependencies. In water projects, the WBS might include phases such as feasibility studies, design and engineering, procurement, construction, testing, commissioning, and operation [24].

Project team building refers to the deliberate process of enhancing the effectiveness and cohesion of a group of individuals who are collectively working towards achieving specific project goals. It involves activities, interventions, and strategies

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aimed at fostering trust, collaboration, communication, and mutual respect among team members [10]. Skills refer to the specific abilities, competencies, and expertise that individuals bring to the project team. In the context of water projects, team members may need technical skills related to engineering, water management, construction, or environmental science. Additionally, interpersonal skills such as communication, negotiation, problem-solving, and leadership are crucial for effective teamwork and collaboration. Skills also encompass project management capabilities, including planning, scheduling, budgeting, and risk management. Having a diverse set of skills within the team ensures that various aspects of the project can be addressed [13].

Training helps in improving skills, updating knowledge, and making sure team members are equipped to perform their roles effectively. It includes formal education, workshops, seminars, certifications, and on-the-job training tailored to specific project needs. In water projects, training may cover technical aspects such as water quality testing, infrastructure maintenance, and community engagement strategies. It can also include training on project management methodologies, safety protocols, and environmental regulations. Ongoing training keeps team members abreast of industry advancements, builds confidence in their abilities, and improves overall project outcomes by ensuring that teams are well-prepared to tackle challenges as they arise [22].

Theoretical Framework

Contingency Theory

In 1960s, Fred E. Fielder developed this Theory and focused on the leadership in an organization. In this contingency model, it contains two relationships which includes the leadership style and favorable-ness in the situation. Fred also developed Least preferred co-worker which is a metric to measure leadership style. Three dimensions were also developed to describe the favorable-ness situation and these include, Lead member relationship whereby the followers accept and respect the leader, Degree of task structure this is the situation where the task is structured high and leaders position power this is where there is high deal of power and authority attributed to leaders' position [21].

According to [14] Contingency theory in management concludes (no one best way) this means that in management, when doing things different situations lead to different approach to manage, solve and to handle issues concerned.

Organization and Management is like an open system where by every now and then issues and challenges occur and they need to be handled and solve these situations. We have two types of contingency leadership; one we have leaders who are task oriented, these are leaders who are focused on task in terms of goal oriented who make sure the project is completed on time. These leaders due to complete the project ion time they tent to be more authoritative and more on directive leadership style. The disadvantage of this leadership style is that despite completing the project effectively they leave employees uninspired. The other leadership style is relationship-oriented leaders who despite there project may run out of time or late, they build a strong relationship with employees and they motivate employees [24]. This theory was fit in determining the effect of project planning on performance of water projects in Makueni County, Kenya.

Conceptual Framework

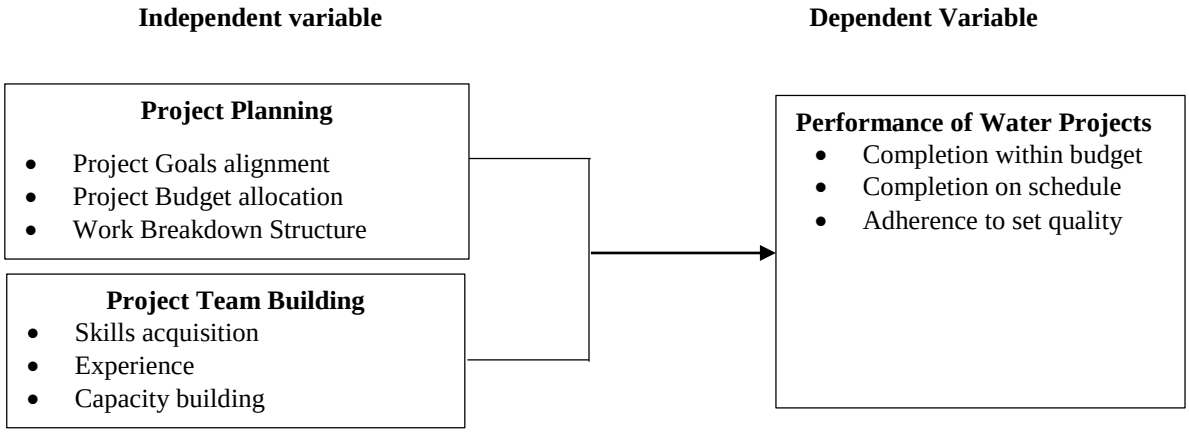

Figure 1: Conceptual Framework

This study is intendent to investigate the effect of Project Planning and project Team Building on the water projects performance in Makueni County, Kenya in the conceptual framework. There are three indicators on each objective.

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III. RESEARCH METHODOLOGY

Descriptive research design was used in this study. [5] notes that a descriptive survey seeks to obtain information that describes existing phenomena by asking questions relating to individual perceptions and attitudes. To analyse quantitative data Five-point Likert scale was used. The study population consisted of Project Engineers and site Managers in Makueni County, Kenya.

[25] was used to determine the sample size since the population was less than 10,000. Where: n indicates the sample size; N indicates the population under study (185); and e indicates the margin error (0.05).

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

$$n = \frac{185}{(1 + 185(0.05)^2)}$$

$$n = 126$$

Thus, the study was administered with questionnaires of 126 respondents mention above. The study used simple random sampling to select a sample of 126 project engineers and site managers from the target population. With simple random sampling, each unit of the population has an equal probability of inclusion in the sample [5].

TABLE 1. SAMPLING FRAME

Category	Target Population	Sample Size
Project engineers	111	76
Managers	74	50
Total	**185**	**126**

Self-administered questionnaire was used to collect data which is quantitative. This was the good method to collect data because respondents get clarification. Self-administered questionnaires offer researchers the potential to reach a large number of potential respondents in a variety of locations [4].

Before the commencement of data collection, an introductory letter from the JKUAT was issued to the researcher for data collection. NACOSTI Authorization letter was also used for data collection.

Likert scale questionnaire was used in this study. Validity and reliability of the research instrument was measured by the researcher.[5]. Reliability measurement was determined using Cronbach's coefficient alpha technique.

$$\alpha = \frac{K * r}{1 + (K - 1) * \acute{r}}$$

Where:

K is the number of variables,

r- the bar is the average correlation among all pairs of variables.

Mean and standard deviation are Descriptive statistics while Multiple regression and correlation analysis are Inferential statistics which are used in this study research. This research study used Multiple regression Analysis [19].

The research model that guided this study was:

$Y = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

Where:

Y= Performance of water projects in Makueni County, Kenya

β0 = Constant

B1-2= Beta coefficients

X1= Project planning

X2 = Project team building

ε = Error term

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IV. RESEARCH FINDINGS AND DISCUSIONS

A. Questionnaire Return Rate

TABLE 2: RESPONSE RATE

Category	Frequency	Percentage%
Responded	96	76.2
Not responded	30	23.8
Total	**126**	**100**

126 respondents was the sample size of this study. This ample size was sampled by the researcher using questionnaires. The return rate of this study was 96 hence response rate of 76.2%. This response rate was suitable and fit for the data collection [19].

B. Distribution of Respondents by their Level of Education

TABLE 3: DISTRIBUTION OF RESPONDENTS BY THEIR LEVEL OF EDUCATION

Level of education	Frequency	Percentage
Diploma	22	23.3
Undergraduate	32	33.6
Masters	24	24.2
PhD	18	18.9
Total	**96**	**100.0**

The respondents were further requested to indicate their level of education. The results were as shown in Table 4.6. From the results, 33.6% of the respondents indicated undergraduate, 24.2% of the respondent's indicated masters, 23.3% of the respondents indicated diploma while 18.9% of the respondents indicated PhD. This implies that the respondents had adequate education to provide the information needed.

C. Project Planning

In relation to project planning, from the finding shown in Table 4. The respondents were given various items rated on Five-point Likert scale. Table 4 shows the level of agreement on project planning and performance of water projects. In the descriptive analysis, the CM stands at 3.77 with a SD of 0.77. This study showed that respondents strongly agreed with project planning as the solution for water projects performance. The item 'The project goals and objectives are clearly defined and understood by all stakeholders' revealed to have highest mean of 3.968 with a SD of 0.636.

TABLE 4: PROJECT PLANNING

Statement	Mean	Std. Deviation
The project goals and objectives are clearly defined and understood by all stakeholders.	3.968	0.636
The project goals align effectively with the needs and expectations of the community and authorities	3.830	0.972
Unforeseen expenses or budget overruns is managed promptly and effectively.	3.712	0.705
The allocated budget matches the financial requirements of the water project.	3.710	0.608
The WBS facilitates efficient assignment of responsibilities and allocation of resources.	3.697	0.873
Adjustments or improvements to the WBS are made as necessary during the project execution phase.	3.684	0.798
Aggregate	**3.767**	**0.765**

This was followed by 'The project goals align effectively with the needs and expectations of the community and authorities' (mean =3.830, S. D= 0.972), 'Unforeseen expenses or budget overruns is managed promptly and effectively' (mean =3.712, S. D= 0.705), 'The allocated budget matches the financial requirements of the water project' (mean =3.710, S. D= 0.608),

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'The WBS facilitates efficient assignment of responsibilities and allocation of resources' (mean =3.697, S. D= 0.873), 'Adjustments or improvements to the WBS are made as necessary during the project execution phase' (mean =3.684, S. D= 0.798).

In relation to water projects planning, majority of the respondents attested that project goals and objectives are clearly defined and understood by all stakeholders. This concurs with the finding by [21] who states that Project goals alignment defines the specific outcomes and objectives that the project aims to achieve. These goals provide clarity and direction, guiding all activities and decisions throughout the project lifecycle.

Clear and well-defined goals help align the efforts of the project team and stakeholders towards a common purpose, ensuring that everyone understands what success looks like. Effective project goals are typically SMART: Specific, Measurable, Achievable, Relevant, and Time-bound.

D. Project Team Building

In relation to Project Team Building, various statements of the project team building were examined. From the finding shown in the Table 5. The respondents were given various items rated on Five-point Likert scale. Table 5 shows agreement level Project Team Building and water projects performance. In the descriptive analysis, the CM stands at 3.730 with a SD of 0.823. This showed that respondents strongly agreed with Project Team Building as the solution for water projects performance.

The item 'There is a good balance of skills within the project team to effectively accomplish project tasks' was found to have highest mean of 3.818 with a SD of 0.664.

TABLE 5: PROJECT TEAM BUILDING

Statement	Mean	Std. Deviation
There is a good balance of skills within the project team to effectively accomplish project tasks.	3.818	0.664
The skills of team members complement each other, contributing to overall team effectiveness.	3.779	0.858
The project team members have relevant experience that aligns with the requirements of the project.	3.755	0.902
The collective experience of the project team contributes positively to project planning and execution	3.688	0.910
The project team receives adequate training to perform their roles effectively	3.675	0.841
The training provided is relevant and beneficial to the project's success	3.662	0.762
Aggregate	**3.730**	**0.823**

This was followed by 'The skills of team members complement each other, contributing to overall team effectiveness' (mean =3.779, S. D= 0.858), 'The project team members have relevant experience that aligns with the requirements of the project' (mean =3.755, S. D= 0.902), 'The collective experience of the project team contributes positively to project planning and execution' (mean =3.688, S. D= 0.910), 'The project team receives adequate training to perform their roles effectively' (mean =3.675, S. D= 0.841), 'The training provided is relevant and beneficial to the project's success' (mean =3.662, S. D= 0.823).

In relation to water projects performance, majority of the respondents attested that there is a good balance of skills within the project team to effectively accomplish project tasks. This concurs with the finding by [22] who states that Training helps in improving skills, updating knowledge, and ensuring that team members are equipped to perform their roles effectively.

It includes formal education, workshops, seminars, certifications, and on-the-job training tailored to specific project needs. In water projects, training may cover technical aspects such as water quality testing, infrastructure maintenance, and community engagement strategies. It can also include training on project management methodologies, safety protocols, and environmental regulations. Ongoing training keeps team members abreast of industry advancements, builds confidence in their abilities, and improves overall project outcomes by making sure that teams are equipped to tackle overcome challenges as they arise.

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TABLE 6: REGRESSION MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.275[a]	.075	.60	1.59127

a. Predictors: (Constant), project planning, project team building

According to Table 6, the value of adjusted R2 is 0.60. This study revealed that, there was a variation of 60% of water projects performance with variation in the dependent variable (performance of water projects) while the rest are error term."

TABLE 7: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	25.405	2	12.702	5.016	.008[b]
	Residual	311.453	123	2.532		
	Total	336.857	125			

a. Dependent Variable: performance of water projects in Makueni County, Kenya

b. Predictors: (Constant), project planning, project team building

The model of this study research was significant since Project Planning and Project team building influences water projects performance at 0.008 significant level. The research finding for ANOVA on Project Planning and Project team building indicates a numerator for whose degree of freedom (df) is 2 denominator df =125. The study finding shows F-test to determine whether the model had a good fit for the data. The F-test (F=5.016, P=0.008<0.05). From this research findings regression model is significant since P value = 0.008 which is less than 5%.

TABLE 8: Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	15.649	0.848		18.449	0.000
project planning	0.034	0.036	0.087	0.932	0.003
project team building	0.093	0.037	0.231	2.493	0.004

a Dependent Variable: water projects performance in Makueni County, Kenya

($Y = 15.649 + 0.034X_1 + 0.093X_2 + \varepsilon$)

Project planning and project team building from this study revealed that this leads to water projects performance by a factor of 0.034 and 0.093 with P value of 0.003 and 0.004. P value is less than 0.05 meaning it is significant with reference to 5% level of significant and 95% level of confidence.

V. CONCLUSION

The research study showed that project planning has a positive and significant effect on performance of water projects in Makueni County, Kenya. From the results, the respondents agreed that the project goals and objectives are clearly defined and understood by all stakeholders. In addition, the respondents agreed that the project goals align effectively with the needs and expectations of the community and authorities. Further, the respondents agreed that unforeseen expenses or budget overruns is managed promptly and effectively. The respondents also agreed that the allocated budget matches the financial requirements of the water project. In addition, the respondents agreed that the WBS facilitates efficient assignment of responsibilities and allocation of resources. Further, the respondents agreed that adjustments or improvements to the WBS are made as necessary during the project execution phase.

The research study revealed that project team building had a significant and positive influence on water performance in Makueni County, Kenya. From the results, the respondents agreed that there is a good balance of skills within the project team to effectively accomplish project tasks. In addition, the respondents agreed that the skills of team members complement

each other, contributing to overall team effectiveness. Further, the respondents agreed that the project team members have relevant experience that aligns with the requirements of the project.

The respondents agreed that the collective experience of the project team contributes positively to project planning and execution. In addition, the respondents agreed that the project team receives adequate training to perform their roles effectively. Further, the respondents agreed that the training provided is relevant and beneficial to the project's success.

VI. RECOMMENDATIONS

Project Planning in the performance of water projects. According to the data on Table 4.7, the study revealed that there is need where unforeseen expenses or budget overruns is managed promptly and effectively, the allocated budget matches the financial requirements of the water project, the WBS facilitates efficient assignment of responsibilities and allocation of resources and adjustments or improvements to the WBS are made as necessary during the project execution phase. This will enhance water projects performance in Makueni County.

There is need to enhance Project Team Building in the performance of water projects. According to Table 4.8, the study revealed that there is need for collective experience of the project team contributes positively to project planning and execution, also there is a need for the project team to receive adequate training to perform their roles effectively and the training provided is relevant and beneficial to the project's success. This will enhance water projects performance in Makueni County.

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