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PUBLIC PARTICIPATION INFLUENCE ON SUSTAINABILITY OF WATER PROJECTS IN MAKUENI COUNTY, KENYA

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ABSTRACT

The main objective of this study was to ascertain the impact of public participation on the sustainability of water projects in the Makueni sub-county. Evaluating the effects of participatory management, planning, and monitoring on the sustainability of water projects in Makueni Sub County-Makueni County was the specific aim of the study. Theoretically, sustainability theory and community participation theory underpinned the research. Target population 34,352 households, 117 members of the Project Management Committee, and 15 county officers are the study's target population. A sample size of 380 was selected using simple random sampling. The 15 technical officers were selected using a census, yielding a sample size of 395 in total. For the goal of triangulating data, both quantitative and qualitative data for the study was collected using a structured questionnaire, which employed a descriptive research design. Using SPSS version 23, descriptive analysis of the collected data was performed before being shown as graphs and frequency tables. To describe the link between the variables, a multiple regression model was employed. The regression analysis demonstrates that participatory planning has a strong and positive effect on the sustainability of water projects in Makueni Sub County. It shows that as the level of community involvement in planning activities increases, the sustainability of these projects improves significantly. Similarly, participatory management positively influences sustainability, indicating that engaging local communities in the management and decision-making processes of water projects contributes to their long-term success. Additionally, the analysis highlights that participatory monitoring is associated with better sustainability outcomes. The study recommends that increased community involvement in monitoring and evaluation activities helps identify and address issues promptly, thereby enhancing the overall effectiveness and durability of water projects.

Key Words: *Participatory Planning, Participatory Management, Participatory Monitoring*

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INTRODUCTION

Through public engagement, people, governments, and Non-Governmental Organizations can have an impact on decisions about development, policy, law, oversight, and service delivery (Munyao, 2019). The process is participatory in both directions, with the duty bearer responding to the public's requests and is accountable for doing so. The public is involved in decision-making processes, and information is disseminated in an open and timely manner. It should be possible for any member of the public to take part in county governance, either independently or through self-organization (World Bank Group, 2023). However, participation by communities in their region is imperative. This is because the community members are able to own the development process when fully involved hence increased sustainability. The government and development partners have a mandate to play to ensure that the communities appreciate that they participate in a number of development projects (United States Environmental Protection Agency, 2024).

Participation in the impact assessment of initiatives sponsored by donors is more prevalent in Africa and Asia (Gawrońska, Gawroński, Król & Jarosz, 2020). Public engagement has usually been limited to non-binding policy procedures in many developing nations, as opposed to industrialized ones, where it has tended to assume a more legal shape Major-scale water infrastructure projects are financed in major part by international organizations. International financial institutions must give additional information and confer with impacted parties, as well as provide a means for those communities to contest the institution's decision (Owusu-Asante, Darko, Walker & Salek, 2022).

Comparatively, Africa has the least amount of water supply coverage overall. Large quantities of money are annually invested in the development of rural water supply projects by local and international NGOs, national and regional governments, and other interested parties in Africa and other developing countries (Winkler, Adongo, Binka, Brugger, Diagbouga, Macete & Okumu, 2019).

African governments and regional organizations deliberated on how to integrate concepts of environmental governance into national laws and regional initiatives, adhering to worldwide trends. There is a discernible public involvement in national state-of-the-environment reporting processes including Lesotho, Malawi, South Africa, and Zimbabwe. The African Charter for Popular Involvement in Development and Transformation (Blumm & Wood, 2021) is another example of the trend toward public involvement.

Despite the ongoing efforts of community-based water projects, there is still not enough clean drinking water available for the world's ever-increasing population. Soon after the project's backers close it, the majority of water projects fall short of their goal of supplying communities with safe water. To improve the return on investment of the water supply investment, these systems' failure rates should be lowered.

The establishment of frameworks and strategies for public involvement has advanced significantly in a number of counties (Auriacombe & Sithomola, 2020). Makueni and Elgeyo-Marakwet counties are important places that have consciously attempted to mainstream citizen participation in development, according to World Bank research. The term "citizen participation" was initially used by the Makueni County Government to refer to corrective measures taken to involve clients or inactive citizens in government activities. However, it can also refer to independent citizen initiatives in larger society, such as social action, social planning, and local or community development.

Makueni County has worked to create relevant structures and techniques for ensuring public engagement in budgeting and other governance processes in order in order to alleviate the shortage of water. That featured in a wide-ranging discussion between state and non-state actors about public information access and communication, capacity building, and active participation in project planning processes. Achieving a balance between reducing failure rates and increasing success rates is essential for successful deployment and execution. It is simpler to implement and carry out the plan and produce the intended results when organizational procedures, organizational capabilities, and strategy are all correctly matched (Nafula, 2019).

Statement of the Problem

Water project sustainability in Kenya remains low, despite the fact that stakeholder participation is recognized as a basic component in community development. Several studies have been undertaken on water supply and its consequences on human life, but none, as far as the researcher is aware, have focused on Makueni Sub County, despite its large population, poverty rate, and ongoing water deficit. The principal objective of involvement of general public is expected to educate, involve, confer, work together, and sanction the people through a variety of mechanisms such as public participation in events like elections or civil society initiatives pursued throughout the implementation process. However, the culture of public bureaucracy discourages public participation and instead relies on traditional information sharing channels such as public hearings, which are typically one-sided and do not focus on issue solving (Baker *et al.,* 2005).

Aupe and Sagwa (2020) note that, while community development has long been acknowledged as a desirable undertaking, the relevance of stakeholder participation in water sustainability projects has been underemphasized. The deficiency can be attributed to a misunderstanding of project development (Chitonge, 2014). As a result, despite attempts by the Kenyan government and community initiative agencies to increase community participation, stakeholder participation in water distribution remains inadequate in the majority of the country.

The looming gap between people's involvement in development and sustainability raises several questions that need to be taken care of in order to accomplish project sustainability through effective participation, such as the involving stakeholders in the planning, funding, execution, observing, and assessment of projects (Christopher & Beal, 2022). Kenya's devolved government requires stronger local participation in all planning and implementation.

The Kenyan government and other development organizations have launched a number of programs to address the water issue in Makueni County however they have not had the desired impact. Thus, the aim of this research was to investigate the relationship between public participation and water project sustainability.

Objectives of the Study

The research was guided by the following objectives:

- To assess the influence of participatory planning on sustainability of water projects in Makueni sub county
- To establish the influence of participatory management on sustainability of water projects in Makueni sub county.
- To determine the influence of participatory monitoring on sustainability of water projects in Makueni sub county

LITERATURE REVIEW

Empirical Literature Review

Participatory Planning and Sustainability of Water projects

According to John and Atikiya 2017, planning is the process of establishing goals, devising strategies, laying out execution plans, and assigning resources to attain those goals. Several elements contribute to a project's sustainability, including planning and design, well-coordinated implementation, and monitoring and assessment processes that correct weak areas while reinforcing effective areas. Planning ensures that time and resources are allocated to projects through public participation. It also contributes to the establishment of indicators for evaluating public officials' involvement with the public, which is an important part of democratic government and sustainable development (Shaukat & Sajjad, 2022).

Diluxshana and Nanthagopan (2020) did a study to evaluate participative methods in non-governmental organizations' (NGOs) community development initiatives in Northern province Sriranka, which established

that participatory approaches are widely used by non-governmental organizations (NGOs) during the phases of project initiation, planning, execution, and assessment, including participatory meetings, teamwork, fieldwork, community gatherings, open dialogue, cross-sectional walking, rural and needs assessments, and participatory evaluation.

Participatory Monitoring and Sustainability of Water Projects

According to Bonareri (2020), project monitoring and assessment enhance general efficacy of the management, planning, and implementation of the project having an aim of positively influencing sociopolitical and economic condition of residents in a certain region. Effective project monitoring and evaluation is typically one of the components that contribute to effective performance of the project. By documenting lessons discovered either by sharing experiences with other implementers or by utilizing them in project's implementation and extending them in future project planning and execution, it facilitates corporate education and provides a means of openness and responsibility to stakeholders.

In order to attain sustainability, Thompson (2021) suggests using involvement in the observation process and assessment in life cycle management of projects. This is due to its capacity to provide the rural water sector with much-needed funding. Verification of the maintenance of water systems can be done using data utilized by service providers, as donors have become pickier about the value their money generate, resulting in performance-based contracts that can be supported through Results-Based Aids. As suggested by (Hope et al., 2020; McNicholl et al., 2019), results-based financing for rural water sector may serve as an indicator of the caliber of the services provided, but these output measurements are only stand-ins for the more elusive benefits of improved livelihoods and health.

Participatory Management and Sustainability of Water Projects

The importance of water management is explicitly stated in SDG-6 which calls for sustainable management of water (Sadoff, Borgomeo & Uhlenbrook, 2020). Community-managed water systems' sustainability is based on the system's technological features as well as the water committee's managerial traits. Akelo and Nzengya's (2021) research on Community-Based Water Projects' administration, seasonality, and water use in Urban Slums investigated the paths by which a water committee may successfully rehabilitate a broken-down system, as well as the barriers that impede system repairs. The study discovered that committees may rehabilitate systems through a variety of pathways, but all of them needed the mobilization of financial resources, with the majority requiring assistance from external support actors.

Mathayo and Kinyina's (2022) research on NGOs' methods and challenges in monitoring and evaluating in Musoma, Tanzania advised that water consumers be trained to help with monitoring and evaluation, allowing them to interpret meter data and establish and assess water tariffs. Understanding pricing in relation to consumption promotes ownership and responsibility for water service provision. Better water provision for consumers is the outcome of the combined inspection and reporting, which guarantee process adherence and promote openness in the administration of water supply projects.

The Agha Khan Rural Support Program in Northern Pakistan provided funding for Murad and Zulfiqar's study from 2023, which discovered that community-managed initiatives functioned better than those under local government administration. Similarly, Muniu, Gakuu, and Rambo (2017) clarify that ensuring community-benefitting initiatives are maintained by community members can lead to increased sustainability in rural areas. These experts' empirical findings thus affirm the idea that community involvement is critical to project sustainability and increased ownership.

Theoretical Review

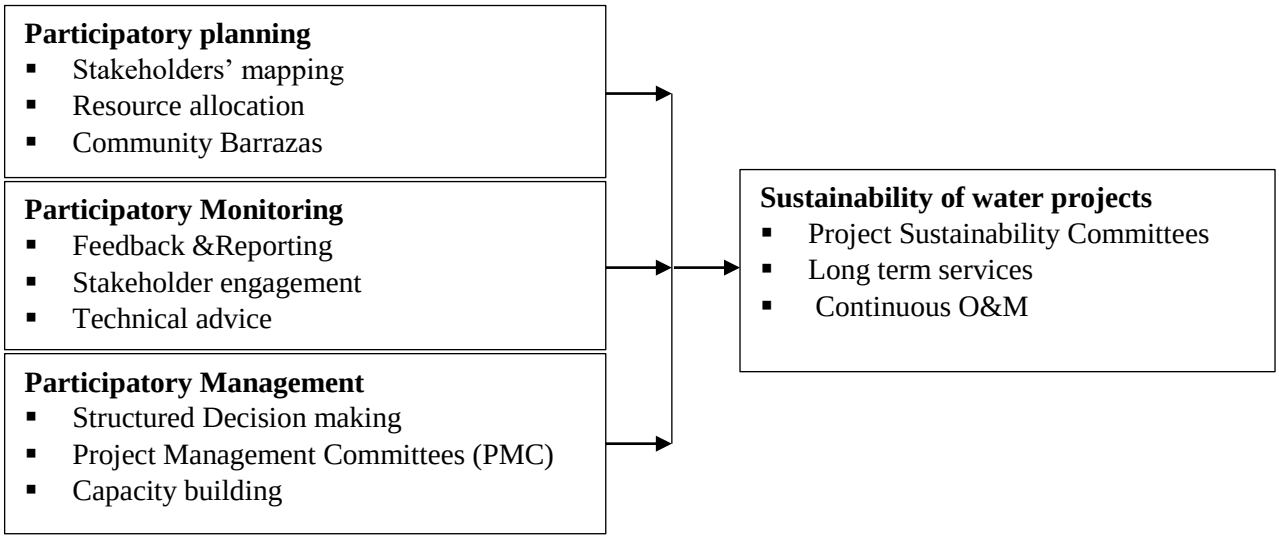
Community Participation (CP) Theory

The community development movement of the 1950s and 1960s serves as an influence for contemporary community involvement philosophy. Proponents of this technique, including (Aupe & Sagwa 2020), argue that it is relevant as an alternate strategy for improving water access in vulnerable populations (Anderson & Ostrom, 2008). The demand-responsive strategy is incorporated into the community involvement theory as an alternate approach to the water projects sustainability. In Africa, the CP philosophy rose to prominence in the 1960s, particularly in donor-funded projects. Community participation is not a new phenomenon; it originated in precolonial Africa when community people banded together to carry out local development projects. In Tanzania, communities worked together to create roads, schools, and community health units using their own materials and labor (Njon, 2010).

Sustainability Theory

Professor Tim Waring introduced this theory to explain when and how the human societies might sustainably manage the environment's resources. The issue is based on collaborative science (Waring, 2017). Sustainability aims to integrate and prioritize societal responses to both cultural and environmental challenges. An economic model prioritizes the preservation of financial capital and natural resources while also considering ecological integration and biological variety (Enfors, 2009). The notion of sustainability refers to methods of mitigating environmental issues that interfere with healthy economic, social, and ecological systems. The question would be whether people are capable of maintaining themselves without necessarily destroying the resources they rely on. The notion of sustainability is based on the primary principle that development should promote the satisfaction of perceived needs without discouraging future generations from meeting their own requirements (Rockstrom *et al.*, 2021). Sustainability models consider sustainability in the context of what needs to be sustained. Economic, political, and ecological models are never mutually exclusive; rather, they embrace each other's complimentary qualities. The economic paradigm of sustainability proposes preserving opportunity, often in the form of wealth.

Conceptual Framework



Independent Variable **Dependent Variable**

Figure 1: Conceptual Framework

Source: Researcher (2024)

METHODOLOGY

For this study, a descriptive survey research design was used. Makueni Sub-County was the site of the study because it's a semi-arid area, experiencing perennial water shortages, with majority of water projects whose sustainability is not known.

This study targeted 34,352 households in Makueni sub-county ,117 chairpersons for 117 water sources which comprises of 108 boreholes and 9 earth dams being water projects in Makueni Sub-County, 7 ward water officers, 1 sub county water engineer and 7 ward administrators.

The study employed simple random sample technique to select 395 participants to administer a questionnaire. 38 participants were chosen at random for pilot test in Kibwezi West Sub county to evaluate the reliability and validity of the research instrument.

To ensure that all pertinent items for study subjects and contexts are included, content validity was utilized. The measurement employed was test-retest method, in which questionnaires are sent to a group of people who share the same characteristics as the sample. Cronbach's alpha was used to evaluate the outcomes of every test.

The questionnaires elicited both quantitative and qualitative responses. Quantitative data from the demography area and other closed-ended questions were evaluated with statistical software (SPSS 26). Manual analysis was performed on the qualitative data to determine patterns, similarities, and differences in replies. Content analysis was used to evaluate qualitative data.

FINDINGS AND DISCUSSIONS

Response Rate

In this study, a total of 395 questionnaires were distributed to various respondents involved in water project management and community engagement. Out of these, 300 completed questionnaires were successfully collected, yielding a return rate of 75.9%.

Participatory Planning

This objective's study sought to evaluate how participatory planning affected the sustainability of water projects in Makueni subcounty. Table 1 displays the findings of the data.

Table 1: Participatory Planning

Participatory Planning	N	Mean	Std. Deviation
Public input is welcome and is taken into consideration in decision-making process by the County Government or decision-maker(s).	300	3.5867	1.09231
The County values diversity and acknowledges that everyone in the community has a right to participate in decisions that impact their daily life and to be heard.	300	3.6733	1.10030
During the planning stage, the County adds sustainability goals to project designs.	300	3.3633	1.18434
We take part in choosing which water projects in our ward, is prioritized and carried out.	300	3.3500	1.21618
In our ward, we take part in setting project goals and objectives.	300	3.3067	1.26410
We are active in creating project schedules in our ward.	300	3.7700	.95576
We plan both short- and long-term projects in our ward to guarantee sustainability.	300	3.7224	1.21230
The County Government plans and creates public engagement programs for water projects in close collaboration with relevant stakeholders.	300	3.4133	1.25208
Total Mean		3.523	

Source: Research Data (2024)

The data reveals how respondents perceive the impact of participatory planning on the sustainability of water projects in Makueni Sub County. Overall, there is a moderate level of agreement with the role of participatory planning, with a total mean score of 3.523. This suggests that respondents generally believe that involving the community in planning activities contributes positively to project sustainability. The findings correlate with Equs (2024) who discovered that sustainable development initiatives can be more successful and produce long-term benefits for people and the environment if community members are actively involved in the planning, decision-making, and implementation processes.

Respondents feel most engaged in creating project schedules, which received the highest mean score of 3.7700. This indicates that they are actively involved in planning the timing and implementation of projects in their sub-counties Similarly, they recognize the importance of planning both short- and long-term projects to ensure sustainability, as reflected in a mean score of 3.7224.

The findings correlate with According to Laurent and Ernest (2021), using a variety of channels boosts beneficiaries' involvement in the initiative. More involved communities throughout the planning stage also other project phases, create the necessary resources to continue the project when it is phased out, and can maintain the successes of these kinds of enterprises.

The perception that the County values diversity and acknowledges the community's right to participate in decision-making processes also scores relatively high, with a mean of 3.6733. This suggests that respondents believe the County Government is committed to inclusive participation.

However, there are areas where respondents feel less involved. For instance, participation in establishing project goals and objectives, and in prioritizing water projects for their sub-counties, received lower mean scores of 3.3067 and 3.3500, respectively. This suggests that although there is a general sense of involvement, community engagement with these particular parts of planning should be improved. The findings correlate with Laurent and Ernest (2021) who stated that community people' active participation enhances project success planning. This study also shows that the degree of community involvement in project planning correlates with involvement of various stakeholders.

Participatory Management

In this objective, the study sought to establish the influence of participatory management on sustainability of water projects in Makueni sub county. The data is presented in table 2.

Table 2: Participatory Management

	N	Mean	Std. Deviation
Good management of water sources is in place in your community	300	4.0433	1.05126
There is a committee in place for seeing the day-to-day operations of the water projects in order to attain their targeted objectives in the community	300	3.4100	1.40063
There skills required for appointment to local management committees of water projects	300	3.3367	1.20617
PMCs enhance management and sustainability of water projects	300	4.4300	.53484
There is willingness to pay and use water by community members	300	4.3467	.56054
There exist project sustainability committees after the project has been handed over to the community	300	4.0000	.97116
Total Mean		**3.926**	

Source: Research Data (2024)

The data on participatory management and its influence on water projects' sustainability in Makueni Sub County indicates a generally positive view of the role of participatory management practices. With a total mean score of 3.926, respondents generally agree that participatory management contributes to the effective management and sustainability of water projects. However, Ndubi (2018) found in his research that there was

a lack of project ownership because stakeholders did not participate much in implementation of water and sanitation projects.

The statement regarding the enhancement of management and sustainability of water projects by participatory management committees (PMCs) received the highest mean score of 4.4300, indicating strong agreement among respondents that PMCs play a crucial role in ensuring success and longevity of these projects. This is closely followed by the willingness of community members to pay for and use water, which has a mean score of 4.3467. This suggests that the community's readiness to financially support and use water services contributes positively to project sustainability. This correlates with Christopher & Beal (2022) who found that effective participation, such as the involving stakeholders in the planning, funding, execution, observing, and assessment of projects.

Respondents also expressed a favorable view of the existence of project sustainability committees after the project has been handed over, with a mean score of 4.0000. This suggests a view that the continued success of water projects depends on the existence of such committees.

On the other hand, while respondents agree that good management of water sources is present in their community, reflected in a mean score of 4.0433, there is a slightly lower level of agreement regarding the presence of local management committees and the skills required for these positions. The mean scores for the presence of a committee overseeing day-to-day operations (3.4100) and the skills needed for committee appointments (3.3367) suggest that there may be some concerns or gaps in the implementation and effectiveness of these management structures. According to Akelo and Nzengya's (2021) committees may rehabilitate systems through a variety of pathways, but all of them needed the mobilization of financial resources, with the majority requiring assistance from external support actors.

Participatory Monitoring

The purpose of this objective was to ascertain how participatory monitoring affected water projects' sustainability in Makueni Sub County. Table 3 presents the data.

Table 3: Participatory Monitoring

	N	Mean	Std. Deviation
There are adequate systems for adequate Monitoring of water projects	300	3.7567	1.22028
We are participating in the examination of performance reports in our ward.	300	3.7600	1.04852
In our ward, we are involved in the monitoring of the water supply system	300	3.2800	1.03206
In our ward, we are involved in reporting vandalism and breakages	300	3.6833	1.20606
In our ward we participate in monitoring meetings	300	3.9167	1.09257
In our ward, we are involved in evaluating the O&M maintenance	300	4.1600	.72306
We use M&E information to make improvements and take measures to correct problems.	300	4.3400	.71140
Total Mean		**3.8423**	

Source: Research Data (2024)

The data on participatory monitoring and its impact on water projects' in Makueni Sub County reflects a generally positive view of community involvement in monitoring activities, with a total mean score of 3.8423. The findings are in agreement with Aupe and Sagwa (2020) who found a significant, moderately positive correlation between the water projects' sustainability and involvement of stakeholders in monitoring and assessment.

Respondents feel that there are adequate systems in place for monitoring water projects, with a mean score of 3.7567. This suggests a moderate level of agreement that monitoring systems are effectively established. Participation in examining performance reports in their sub-counties is also viewed positively, receiving a

mean score of 3.7600, indicating that community members are engaged in reviewing the progress and performance of water projects. According to Oduor and Murei (2020) the community's limited participation in closely examining project reports was due to their low attendance and engagement at M&E meetings, wherein they voiced concerns and/or questions about project's handling in accordance with the objectives of sustainability

Involvement in reporting vandalism and breakages, with a mean score of 3.6833, and participating in monitoring meetings, which scored 3.9167, reflect an active role of respondents in maintaining and overseeing water project operations. This indicates that while there is a solid level of engagement, there may be varying degrees of involvement in different aspects of monitoring.

The highest level of agreement is seen in the use of monitoring and evaluation (M&E) information to make improvements and address issues, with a mean score of 4.3400. This suggests that respondents believe the feedback and data gathered through monitoring are effectively utilized for problem-solving and enhancing project performance. China, Fauzia, and Kamande (2021) found that the Mwisoko project's sustainability was positively impacted by the monitoring and assessment procedure. The Mwisoko project's sustainability is closely linked to the methods used for monitoring and evaluation.

Involvement in evaluating operations and maintenance (O&M), with a mean score of 4.1600, further highlights that respondents are actively engaged in assessing ongoing maintenance efforts. However, participation in monitoring the water supply system itself, with a mean score of 3.2800, appears to be less emphasized, suggesting room for increased involvement or focus in this area.

Table 4 presents data on the respondent's perception on sustainability of water projects

Sustainability

Table 4: Sustainability

	N	Mean	Std. Deviation
The water supply from local projects is reliable and consistent throughout the year	300	3.4700	1.14315
The water infrastructure in our community is well-maintained and fully functional.	300	3.6033	1.25881
The community is satisfied with the current water projects and services provided.	300	3.2067	1.24732
The water projects in our community are financially viable and able to meet their operational costs over time.	300	3.7933	1.05245
The water projects in Makueni County are managed in a manner that does not harm surrounding environment and ecosystem.	300	3.5700	1.12069
The water supply from local projects is reliable and consistent throughout the year	300	4.2033	2.54366
Total Mean		**3.6411**	

Source: Research Data (2024)

The data on water projects' sustainability in Makueni Sub County reveals a generally positive view of the sustainability and reliability of these projects, with a total mean score of 3.6411. Respondents perceive the water supply from local projects as reliable and consistent throughout the year, with a mean score of 4.2033, indicating a strong level of agreement. This suggests that the community views the water supply as dependable and steady, which is a crucial factor for project sustainability. According to Bernat, Qualharini, Barcaui, and Soares (2023), a stable project environment also encourages effective stakeholder participation and knowledge development, enabling sustainable project management practices and, ultimately, project success.

The assessment of the water infrastructure's maintenance and functionality received a mean score of 3.6033, indicating that respondents generally feel infrastructure is well-maintained and operational. However,

satisfaction with the current water projects and services scored lower, with a mean of 3.2067, suggesting that there may be areas for improvement in meeting community expectations and needs.

Financial viability of the water projects, with a mean score of 3.7933, indicates that respondents believe the projects are capable of sustaining their operational costs over time. This reflects confidence in the financial management and economic stability of the projects.

Additionally, the management of water projects in a way that safeguards the surrounding environment and ecosystem scored 3.5700, showing that respondents have a moderate level of agreement that environmental considerations are being addressed. Muniu, Gakuu, and Rambo (2017) clarify that ensuring community-benefitting initiatives are maintained by community members can lead to increased sustainability in rural areas

Inferential Statistics

Correlation Analysis

To assess the influence of participatory planning, participatory management, and participatory monitoring on water projects' sustainability in Makueni Sub County, correlation analysis was conducted. This analysis aimed to determine the relationships between these independent variables and the dependent variable—sustainability of water projects. Pearson correlation coefficients (r) were utilized to measure the strength and direction of these relationships. The coefficient values range from +1 to -1, where a value of +1 or -1 indicates a strong relationship between the independent and dependent variables, with positive (+) values signifying a positive relationship and negative (-) values indicating a negative relationship. Coefficients closer to 0 reflect weaker relationships. The results of the correlation analysis are presented in Table 5, illustrating the influence of participatory planning, management, and monitoring on water projects' sustainability.

Table 5: Correlations

		Sustainability	Participatory planning	Participatory management	Participatory monitoring
Sustainability	Pearson Correlation	1	.416**	-.091	.156**
	Sig. (2-tailed)		.000	.115	.007
	N	300	299	300	300
Participatory planning	Pearson Correlation	.416**	1	-.023	-.237**
	Sig. (2-tailed)	.000		.691	.000
	N	299	299	299	299
Participatory management	Pearson Correlation	.091	-.223	1	.215**
	Sig. (2-tailed)	.115	.691		.000
	N	300	299	300	300
Participatory monitoring	Pearson Correlation	.156**	-.237**	.215**	1
	Sig. (2-tailed)	.007	.000	.000	
	N	300	299	300	300

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

The analysis reveals various relationships between the independent variables; participatory planning, participatory management, and participatory monitoring and the dependent variable, water projects' sustainability

Participatory planning is positively correlated with sustainability, as indicated by a significant Pearson correlation coefficient of 0.416. This suggests that effective participatory planning is associated with

improved sustainability outcomes for water projects. When community members are actively involved in the planning stages, their input contributes to the development of projects that are more likely to be sustainable over time. This relationship underscores the importance of incorporating diverse perspectives and planning collaboratively to enhance the long-term success of water projects. The results align with the findings of Diing, Nyonje, Mbugua, and Mutuku, K. (2022), who concluded that the study had a substantial impact on the sustainability of community water point initiatives through participatory project identification.

The correlation between participatory management and sustainability is strong and statistically significant, having a 0.091 Pearson correlation value. This suggests that participatory management techniques and sustainability of water projects have a distinct, direct relationship. Although management is crucial for the effective execution of projects, its direct impact on sustainability, according to this dataset, is evident. The results correlates to those of Murongo and Seuya (2021), who discovered a statistically significant correlation between project sustainability and participatory management. Eventually, this makes rural water supply projects sustainable.

Participatory monitoring shows a positive and statistically significant correlation with sustainability, with a Pearson correlation coefficient of 0.156. This suggests that increased community involvement in monitoring activities is associated with better sustainability outcomes for water projects. When community members actively participate in monitoring and evaluation processes, they contribute to identifying and addressing issues promptly, which helps maintain the effectiveness and longevity of the project. Additionally, Kidombo and Gakuu (2023) discovered that, in the instance of the oil and gas upstream project in Turkana County, Kenya, there was a favorable association (correlation coefficient 0.779) between environmental sustainability and participatory planning of monitoring and evaluation activities.

Regression

Table 6: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1597.526	3	532.509	34.784	.000[b]
	Residual	4516.113	295	15.309		
	Total	6113.639	298			

a. Dependent Variable: sustainability
b. Predictors: (Constant), Participatory monitoring, Participatory management, Participatory planning

The ANOVA results for the regression analysis provide insights into the overall significance of the model in predicting on water projects' sustainability based on participatory practices.

The regression model has a sum of squares of 1597.526 with 3 degrees of freedom, resulting in a mean square of 532.509. This is compared against the residual sum of squares of 4516.113, with 295 degrees of freedom, yielding a mean square of 15.309. The F-value for the regression model is 34.784, and the associated p-value is less than 0.001 (Sig. = .000).

The high F-value and the statistically significant p-value indicate that regression model is highly significant and that combination of participatory monitoring, participatory management, and participatory planning significantly predicts the sustainability of water projects. This suggests that independent variables together have a strong impact on explaining the variation in sustainability outcomes.

Table 7: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.722	3.175		.857	.392
	Participatory_planning	.450	.048	.484	9.384	.000
	Participatory_management	.449	.086	.448	8.883	.000
	Participatory_monitoring	.458	.081	.299	5.679	.000
a. Dependent Variable: sustainability						

The regression coefficients reveal the impact of each independent variable participatory planning, participatory management, and participatory monitoring on water projects' sustainability.

The unstandardized coefficient for participatory planning is 0.450 with a standard error of 0.048. The standardized coefficient (Beta) is 0.484, and the t-value is 9.384 with a p-value of 0.000. This directs that participatory planning has a strong and positive influence on sustainability, with each unit increase in participatory planning associated with a 0.450 increase in sustainability, holding other factors constant. The significance level confirms that this relationship is statistically significant.

For participatory management, the unstandardized coefficient is 0.449 with a standard error of 0.086, and the standardized coefficient is 0.448. The t-value is 8.883, and the p-value is 0.000. This suggests a positive effect of participatory management on sustainability. Specifically, an increase in participatory management is associated with an increase in sustainability by 0.249 units, which is statistically significant. The study's findings align with Lurimuah's (2021) findings., who discovered that every aspect of the participatory project management process—including social support networks and the processes of planning, executing, and closing the project—recorded substantial relationships and an impact on the long-term viability of the GHARHp.

The unstandardized coefficient for participatory monitoring is 0.458 with a standard error of 0.081. The standardized coefficient is 0.299, and the t-value is 5.679 with a p-value of 0.000. This indicates that participatory monitoring also has a positive influence on sustainability. Each unit increase in participatory monitoring is associated with a 0.458 increase in sustainability, and this relationship is statistically significant. The study by Vanessa and Gitahi (2023) also discovered a strong positive correlation between project sustainability and monitoring and evaluation. The study concludes that in order to guarantee that the institutions sponsored by projects and the benefits acquired are maintained and carried over after the project's end, project monitoring and evaluation is a crucial tool for long-term sustainability.

Overall, the analysis highlights that participatory planning, participatory management and monitoring are positively associated with sustainability. These results underscore the importance of focusing on effective planning, participatory management and monitoring to enhance water projects' sustainability.

CONCLUSION AND RECOMMENDATIONS

The regression analysis reveals that participatory planning has a strong and positive impact on the sustainability of water projects in Makueni Sub County. With an unstandardized coefficient of 0.450 and a standardized coefficient (Beta) of 0.484, the results suggest that each unit increase in participatory planning is associated with a 0.450 increase in sustainability, holding other factors constant. This relationship is statistically significant, as indicated by a t-value of 9.384 and a p-value of 0.000. These findings highlight the critical role of involving community members in planning activities to enhance the long-term success of water projects.

Water project sustainability is positively impacted by participatory management as well. The unstandardized coefficient is 0.449, with a standardized coefficient of 0.448, demonstrating that each unit increase in participatory management leads to a 0.449 increase in sustainability. This effect is statistically significant, supported by a t-value of 8.883 and a p-value of 0.000. These results suggest that engaging local communities in the management and decision-making processes of water projects contributes positively to their sustainability.

Additionally, participatory monitoring is associated with improved sustainability outcomes. The unstandardized coefficient for participatory monitoring is 0.458, with a standardized coefficient of 0.299, indicating that each unit increase in participatory monitoring corresponds to a 0.458 increase in sustainability. This relationship is also statistically significant, as reflected by a t-value of 5.679 and a p-value of 0.000. This finding underscores the importance of community involvement in monitoring and evaluation activities, which helps identify and address issues promptly, thereby enhancing the effectiveness and durability of water projects.

Given the significant positive impact of participatory planning on the sustainability of water projects, policymakers should strengthen community involvement in all stages of project planning.

The positive influence of participatory management on project sustainability suggests the need for policies that enhance the capacity of local management committees. Training programs should be introduced to build the skills required for effective governance and management of water projects.

Recommendations for Further Study

Future research should explore the specific barriers that limit community participation in water project planning, management, and monitoring.

Scholars should focus on the potential role of technology in improving community involvement in water project sustainability.

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