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Participatory Monitoring and Evaluation Practices and Performance of Community-Based Irrigation Projects in Western Kenya

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ABSTRACT

The performance of Community-Based Irrigation Projects is vital for improving livelihoods and ensuring food security in arid and semi-arid regions. This study examined the influence of participatory monitoring and evaluation (M&E) practices on the performance of Community-Based Irrigation Projects in Western Kenya. The research was guided by the need to understand how community involvement in M&E can lead to more effective and sustainable project outcomes. Adopting Explanatory sequential mixed method design, the study utilized a census of the entire target population of 111 participants from 12 Community-Based Irrigation Projects. The population included project managers, farmers, and members of Water Users Associations, among others. Data were collected using self-administered questionnaires. The research instrument was validated content validity, achieving a Cronbach's alpha of over 0.70, ensuring its reliability. Data analysis employed both descriptive statistics (frequencies, percentages, means, standard deviations) and inferential statistics (Pearson correlation and simple and multiple linear regression). Five null hypotheses were tested at a 0.05 level of significance. The findings revealed a significant positive relationship between all four participatory M&E practices and the performance of the irrigation projects. Specifically, the study found that participatory M&E planning, data collection, data analysis, and utilization of findings each had a statistically significant influence on project performance ($p<0.05$). The combined effect of all four practices on performance was also found to be statistically significant ($p<0.05$). The study concluded that a holistic and integrated participatory M&E process significantly enhances the performance of Community-Based Irrigation Projects. The findings are expected to inform policymakers and development practitioners on strategies to foster greater community ownership and improve the long-term effectiveness and sustainability of irrigation initiatives in Western Kenya and beyond.

Keywords: participatory monitoring and evaluation, community based irrigation projects, stakeholder engagement, monitoring and evaluation, project management.

INTRODUCTION

Background of the Study

Governments and development agencies prioritize Community-Based Irrigation Projects in developing countries to enhance food security, increase agricultural productivity, boost incomes for farmers, create jobs, and build resilience against climate change impacts like drought (Gaurav, Sharma & Sharma, 2025; Hans, 2025; Baki, Keïta, Palé, Traoré, Bambara, Moyenga & Tychon, 2025). These projects are seen as a vital intervention to overcome the challenges of unreliable rainfall and foster sustainable rural development by empowering local communities with the tools and resources needed to manage and thrive in a changing environment (Gaurav, Sharma & Sharma, 2025; Hans, 2025; Baki, et al, 2025).

Community-Based Irrigation Projects are farmer-owned and managed systems that use shared infrastructure, such as canals or pumps, to provide water for agriculture (Gaurav, Sharma & Sharma, 2025; Hans, 2025; Baki, et al, 2025). They involve collaboration between farmers, government, and the private sector to implement systematic irrigation, promoting economic empowerment, increased food production, and sustainable use of natural resources through collective management of water and infrastructure (Gaurav, Sharma & Sharma, 2025; Hans, 2025; Baki, et al, 2025). These projects often utilize advanced or appropriate technologies, providing training, technical support, and access to markets to enhance farmer success (Gaurav, Sharma & Sharma, 2025; Hans, 2025; Baki, et al, 2025).

The success of Community-Based Irrigation Projects relies heavily on the active participation of smallholder farmers, the community, government entities, and agricultural development partners (Baki, et al, 2025; Yusof, 2025; Lema, 2025; Nawaz & Batool, 2025) , as this collaboration fosters project ownership, ensures relevance, aligns goals, and mobilizes resources. Active involvement from all stakeholders creates shared responsibility, leading to more effective and sustainable outcomes for irrigation projects by aligning them with local needs and facilitating long-term viability (Baki, et al, 2025; Yusof, 2025; Lema, 2025; Nawaz & Batool, 2025). When farmers and community members are actively involved, they develop a sense of ownership, pride, and responsibility for the project, which increases its long-term sustainability and reduces conflict. Participation ensures that project design and implementation are appropriate for the local environment and the specific needs of the community, increasing the chances of success (Baki, et al, 2025; Yusof, 2025; Lema, 2025; Nawaz & Batool, 2025).

Evidence indicates that participatory monitoring and evaluation (PM&E) can improve the performance of Community-Based Irrigation Projects by fostering stakeholder involvement and increasing their ownership, leading to better alignment with community needs and improved resource use and management. Studies have shown that PM&E contributes to achieving project objectives, enhancing functionality, increasing water availability, and improving sustainability.

Participatory Monitoring & Evaluation (PM&E) strengths for Community-Based Irrigation Projects include enhanced project ownership and sustainability by actively involving the community in the process. PM&E fosters increased transparency and trust, addresses potential mistrust, and facilitates better learning and adaptation to changing project conditions. This approach results in improved project outcomes, more efficient resource use, and ensures that the project remains relevant and beneficial to the community long-term.

When community members participate in monitoring and evaluation, they feel a greater sense of ownership and responsibility for the project, leading to increased commitment to its success (Murungi, Ntongai, Huka & Mworia, 2025; Kiratu, Aarnoudse & Petrick, 2025; Boitt & Oganyo, 2025; Wanyonyi, Mokaya & Lango, 2025). Community involvement in PM&E is strongly linked to better long-term project sustainability, as the community is better equipped to manage and maintain the project after external support ends. PM&E helps build trust by making the project process more transparent. Community members can see how decisions are made and resources are used, addressing potential distrust that can arise in traditional project approaches. By engaging stakeholders, PM&E allows for continuous learning and adaptation to local contexts and unexpected changes. Lessons learned are integrated into project management, making it more flexible and responsive (Murungi, Ntongai, Huka & Mworia, 2025; Kiratu, Aarnoudse & Petrick, 2025; Boitt & Oganyo, 2025; Wanyonyi, Mokaya & Lango, 2025).

Research Problem

Community-Based Irrigation Projects in Kenya, despite government and development partner investment, underperform due to challenges like poor infrastructure maintenance, insufficient water resources, inadequate community management and technical capacity, lack of credit and market access, and vulnerability to climate change (Murungi, Ntongai, Huka & Mworia, 2025; Kiratu, Aarnoudse & Petrick, 2025; Boitt & Oganyo, 2025; Wanyonyi, Mokaya & Lango, 2025). These factors hinder efficiency and productivity, making it difficult for these schemes to achieve their potential for food security and economic empowerment. Many schemes suffer from poorly maintained or deteriorating infrastructure, leading to breakdowns and increased operational costs, as seen with pumps in the Bura Irrigation Scheme.

While there are studies demonstrating the positive impact of Participatory Monitoring and Evaluation (PM&E) on project performance in Kenya, including agricultural and community-based projects, a significant gap exists specifically for Community-Based Irrigation Projects, particularly in certain regions like Western Kenya.

Studies on Community-Based Irrigation Projects in Kenya show gaps in research(Murungi, Ntongai, Huka & Mworia, 2025; Kiratu, Aarnoudse & Petrick, 2025; Boitt & Oganyo, 2025; Wanyonyi, Mokaya & Lango, 2025), particularly in the contextual understanding of local socio-economic factors influencing project success, the methodological integration of quantitative and qualitative approaches, conceptual frameworks for assessing community participation, theoretical foundations for sustainability, and the evidence base regarding long-term impacts and best practices(Murungi, Ntongai, Huka & Mworia, 2025; Kiratu, Aarnoudse & Petrick, 2025; Boitt & Oganyo, 2025; Wanyonyi, Mokaya & Lango, 2025). Based on these challenge and research gaps, the overall research question for this study is: What is the relationship between participatory monitoring and evaluation practices and performance of community- based irrigation projects in Bungoma County in Kenya?

Value of the Study

This research on participatory monitoring and evaluation (M&E) in Kenya's Community-Based Irrigation Projects potentially contributes to M&E and irrigation policy by demonstrating how community involvement in planning, implementation, and feedback improves project performance

and sustainability, informing national and county-level policy adjustments to support community ownership, resource mobilization, capacity building, and the integration of effective feedback mechanisms to enhance project effectiveness and long-term viability.

This research on participatory M&E in Kenyan community irrigation projects contributes to project management by providing empirical evidence on how community involvement fosters project ownership, sustainability, and improved performance, thereby informing best practices for stakeholder engagement, resource allocation, and adaptive management within the global Project Management Body of Knowledge (PMBOK). This research highlights specific factors like effective stakeholder participation in planning and evaluation, adequate training on PM&E tools, and sufficient resource provision as crucial for success, creating actionable insights for project managers in similar community-based initiatives worldwide.

The study on participatory M&E in Kenyan community irrigation projects contributes to theory by developing and testing theories about community ownership, empowerment, and project sustainability, elaborating existing frameworks by providing context-specific evidence on how participatory approaches impact performance, and grounding theory in practice through empirical data from on-the-ground experiences. This research provides real-world insights into how stakeholders can collaboratively define evaluation issues, generate knowledge, and take corrective actions, ultimately influencing project ownership and long-term success.

This study on participatory monitoring and evaluation (PME) and the performance of Community-Based Irrigation Projects in Kenya informs new research by: identifying gaps in current PME practices and project performance, highlighting successful strategies for community engagement and ownership, and providing empirical data to develop more effective project models and policy recommendations for sustainable rural development. This research helps create better PME frameworks and promotes community-led approaches for improved irrigation project sustainability and overall project success.

REVIEW OF RELATED LITERATURE

Theoretical foundation

Stakeholder Theory serves as the central anchor theory for this study, supported by Performance Legitimacy Theory, Community Empowerment Theory, and the Theory of Change. Stakeholder Theory emphasizes the importance of considering the diverse interests of all groups involved in a project, while Community Empowerment Theory focuses on enhancing the capacity and control of the community. Performance Legitimacy Theory examines how a project's outcomes and benefits contribute to its perceived value and acceptance, and the Theory of Change outlines the causal pathways through which a project is expected to achieve its intended results.

Stakeholder Theory

Stakeholder theory emphasizes the need to identify and understand the needs, interests, and influence of all relevant groups, including community members, project managers, local authorities, and donors. It provides a framework for understanding how different stakeholders affect participatory M&E. For instance, it helps explain how their involvement in M&E activities, like providing data or participating in meetings, leads to better outcomes. The theory's focus on

various stakeholders underscores how involving the community in the M&E process fosters a sense of ownership and commitment, leading to better project performance and long-term sustainability.

By bringing diverse stakeholders into the M&E process, the theory promotes open communication and accountability, as community members can monitor the project's progress and hold implementers responsible. Understanding stakeholder needs allows for tailored communication and engagement strategies, which can help secure additional support and resources from external stakeholders, crucial for community projects.

Stakeholder theory supports a dynamic approach where engagement with different perspectives provides opportunities for learning and adjusting the project's direction to better align with community needs. The theory shifts the focus beyond purely financial performance to include social and environmental dimensions, making it ideal for understanding how community-based projects contribute to overall community well-being and sustainability.

Stakeholder theory provides a framework to understand how the engagement of diverse actors (local communities, project implementers, funders) in participatory monitoring and evaluation (PM&E) influences the success of Community-Based Irrigation Projects. Advantages include gaining stakeholder support and resources, promoting inclusive learning and corrective action, increasing project ownership and accountability, aligning project goals with community needs, and fostering transparency and legitimacy for better resource management and long-term sustainability.

Performance Legitimacy Theory

Performance Legitimacy theory is a theoretical framework within legitimacy theory where an organization's actions and performance, particularly its social and environmental responsibility, are judged against societal norms and expectations to determine if its operations are acceptable. This theory suggests that businesses must align their behaviors with community values to gain and maintain their social contract, which grants them the right to exist and operate. Companies use disclosure and transparent reporting of their performance to demonstrate this alignment, thereby legitimizing their actions to stakeholders and ensuring their continued survival and success.

Legitimacy theory suggests organizations require the approval and support of society to survive. For irrigation projects, this means gaining the trust and acceptance of the farmers and other stakeholders who use the system. When an irrigation project delivers tangible benefits, such as increased crop yields, improved farmer incomes, and more time for other activities, it demonstrates that the project is meeting its objectives. Farmers will support a system that makes their lives easier. Fair and honest management, efficient water distribution, and visible improvements to canals build trust and a positive perception of the project's performance.

A lack of performance can lead to the withdrawal of resources and support. If an irrigation scheme consistently underperforms, stakeholders may question its value, leading to further underfunding, continued poor maintenance, and even scheme failure. Poor performance isn't always due to intrinsic biophysical or local factors but can stem from broader issues like inadequate policies, poor technology adoption, or flawed production and trading systems. Performance Legitimacy

Theory encourages examining these root causes to implement effective, long-term solutions. When a project fails to perform, it risks becoming underutilized or even abandoned. By focusing on performance, project managers and policymakers can ensure that investments in irrigation are productive and that the community continues to benefit and remain invested in the system.

Performance Legitimacy Theory matters for irrigation projects because it explains how the practical successes or failures of a project, such as improved yields or farmer livelihoods, directly influence the project's legitimacy and continued support from the community and stakeholders. Projects that are perform well, improving farmers' incomes and water access, gain legitimacy and are more likely to be sustained and supported by farmers and the wider society. Conversely, poorly performing projects, often due to infrastructure issues, poor management, or unfair water distribution, lose legitimacy, leading to underutilization and potential abandonment.

Community Empowerment Theory

Community empowerment theory describes the process by which communities, often marginalized groups, gain skills, resources, and confidence to achieve greater control over the decisions and conditions that affect their lives, moving beyond individual needs to foster collective action and lasting positive change. This theory highlights the critical role of power, emphasizing the need to address social, economic, and political imbalances through shared decision-making, capacity building, critical awareness, and partnerships to promote social and health equity. Empowerment theory recognizes that existing power structures often create inequalities, and communities must challenge these imbalances to gain agency and influence.

Empowering communities ensures they have a stake in the project's success. This ownership translates into greater commitment to managing and maintaining the irrigation infrastructure, leading to long-term sustainability rather than dependence on external support. When communities are empowered, they are better equipped to manage water resources effectively. They can develop local knowledge and collaborative practices to distribute water fairly, maintain the infrastructure, and adapt to changing environmental conditions, ensuring the irrigation system functions optimally.

Community empowerment encourages broader participation from all groups, including women, men, and landless individuals. This diverse input leads to more equitable distribution of project benefits and increased participation in decision-making, fostering a sense of collective responsibility and ownership. The process of empowerment includes capacity building and knowledge transfer, which develops the skills and confidence of community members to manage their own resources. This self-reliance reduces dependence on external agencies and builds local institutional capacity.

Community Empowerment Theory matters for irrigation projects because it fosters sustainability, improves resource management, enhances project ownership, and achieves broader socio-economic goals like food security and equitable development. By involving community members in the planning, implementation, and decision-making processes, these projects become more responsive to local needs and conditions, leading to better resource mobilization, increased participation from various groups, and ultimately, a more resilient and effective irrigation system. Empowered communities can use irrigation to enhance their agricultural productivity, which

improves food security and generates income. This, in turn, can lead to improved nutrition, economic stability, and overall socio-economic development within the community.

Empirical Literature Review

Participatory Monitoring and Evaluation Planning and Performance of Community-Based Irrigation Projects

Participatory M&E Planning is a collaborative process where project stakeholders, especially beneficiaries, are directly involved in developing the monitoring and evaluation (M&E) framework, collecting data, analyzing results, and using findings to improve projects. This approach shifts M&E from a top-down control mechanism to a shared learning process, leading to more inclusive, effective, sustainable, and contextually relevant interventions by increasing local ownership and building community capacity.

Participatory M&E planning in Community-Based Irrigation Projects involves actively engaging community members and other stakeholders in the design and implementation of monitoring and evaluation (M&E) systems to ensure projects meet local needs and achieve sustainability. The process includes identifying key stakeholders, defining shared M&E objectives and indicators, collaboratively collecting and analyzing data using both qualitative and quantitative methods, and fostering capacity building so communities can lead the M&E process. This collaborative approach enhances project effectiveness, promotes ownership, and leads to more relevant and sustainable outcomes for the irrigation system.

Participatory Monitoring and Evaluation (PM&E) potentially influences community-based irrigation project performance by fostering ownership, improving decision-making through community involvement, and enhancing resource utilization and project sustainability. Effective PM&E involves the entire community in joint planning, progress assessment, and the adaptive management of the project, leading to a more successful and sustainable outcome than top-down approaches.

Participatory M&E planning is vital for Community-Based Irrigation Projects because it increases local ownership and sustainability by involving farmers in decision-making, leading to more relevant and effectively implemented plans. This process empowers communities to take responsibility for their projects, fosters critical reflection on strategies, and helps ensure that resources are directed to the most pressing needs, ultimately leading to better project outcomes and improved water management.

Strengthening participatory monitoring and evaluation (PM&E) planning in Community-Based Irrigation Projects is crucial because it fosters community ownership, enhances accountability, ensures relevance to local needs, improves project effectiveness, promotes learning and adaptation, and ultimately leads to greater project sustainability. By involving the community in the planning and execution of monitoring, the project benefits from local knowledge, builds trust, and ensures that outcomes are measured against the community's priorities and criteria.

When communities participate in planning and evaluation, they develop a greater sense of ownership and commitment to the project, which translates to increased responsibility for its success and sustainability. PM&E provides stakeholders with timely and relevant information

about the project's progress and challenges, enabling them to make informed decisions to improve performance and address issues effectively.

Researching Participatory M&E Planning in Community-Based Irrigation Projects is crucial because it enhances project sustainability, improves community buy-in and ownership, and leads to better performance by ensuring projects meet local needs and manage resources effectively. Community involvement in M&E promotes ownership, accountability, and the transfer of technical skills, ensuring long-term success and preventing project abandonment and wasted resources.

Participatory M&E Data Collection and Performance of community- Based Irrigation Projects

Participatory M&E Data Collection is an approach where stakeholders, especially beneficiaries, are actively involved in collecting, analyzing, and interpreting monitoring and evaluation data to assess program outcomes, processes, and impacts. This collaborative method leverages local knowledge and promotes ownership and empowerment, leading to more relevant and effective interventions by ensuring M&E systems are responsive to the needs and perspectives of those directly involved.

Researching the link between participatory data collection and community-based irrigation project performance is vital for ensuring success, promoting sustainability, and improving efficiency by providing a foundation for community engagement and informed decision-making. This research helps stakeholders identify project gaps, foster a sense of ownership, improve local participation in project management and monitoring, and tailor projects to community needs, ultimately leading to better resource utilization and higher crop yields.

Participatory M&E data collection matters in Community-Based Irrigation Projects because it increases community ownership, ensures project relevance to local needs, builds trust and accountability, enhances learning and project effectiveness, and promotes long-term sustainability. By involving community members in the M&E process, their unique knowledge is leveraged, leading to better project design and implementation that meets their priorities and ensures that the project's benefits are sustained after external support ends.

Involving community members in data collection fosters a sense of ownership over the project, which leads to greater commitment and a desire to ensure its long-term success. Communities can identify their actual needs and priorities, providing insights into what data is important to collect, ensuring the project remains aligned with what is most beneficial for them. Communities offer diverse perspectives and knowledge that contribute to a more comprehensive understanding of project progress, challenges, and successes, enabling more effective decision-making and adaptation.

Community-based irrigation project stakeholders should focus on participatory M&E data collection to ensure sustainability, improve project effectiveness, enhance community ownership, and facilitate better decision-making by leveraging local knowledge and fostering accountability. This collaborative approach creates a feedback mechanism that helps identify and address challenges, making the project more responsive to community needs and ultimately leading to

better outcomes and increased trust. When communities are involved in data collection, they feel a greater sense of ownership over the project and are more motivated to ensure its success. This involvement fosters local accountability, as community members become active participants in monitoring progress and identifying issues, leading to improved project ownership.

Challenges in participatory M&E data collection for irrigation projects include limited community capacity, such as time constraints and lack of technical expertise; data quality issues from inexperienced collectors or poor data collection methods; stakeholder conflict over differing perspectives and objectives; communication barriers, including language differences; and resource limitations like insufficient funding for training or proper tools. Community members may lack the technical expertise in M&E methods, data collection tools, and analysis required for accurate data gathering. Different stakeholder groups may have different priorities, objectives, and definitions for what is important to monitor, leading to disagreements.

Participatory M&E Data Analysis and Performance of community-Based Irrigation Projects

Participatory M&E data analysis is the collaborative process where project stakeholders, especially beneficiaries, engage in analyzing collected data to understand progress and outcomes. It moves beyond external expert-led analysis by empowering stakeholders to interpret findings, share control over results, identify corrective actions, and foster collective ownership of the data and project. This approach uses adapted tools and methods to suit participants, ensuring that learning, reflection, and adaptive decision-making become integral to the M&E cycle, leading to more relevant and impactful project improvements.

Researching the link between participatory M&E data analysis and community-based irrigation project performance is crucial because it demonstrates how involving the community in evaluation leads to better outcomes. This nexus helps to identify factors that contribute to enhanced sustainability, efficiency, and overall success by fostering community ownership, accountability, and informed decision-making. Understanding this relationship is essential for designing and implementing more effective irrigation projects that meet community needs and achieve long-term benefits.

Challenges in involving community stakeholders in participatory M&E data analysis for irrigation projects include low literacy and capacity to use simplified tools, limited resources, and lack of proper training, information access issues, power imbalances and domination of discussions, low motivation or perceived incentives for participation, logistical constraints, and weak communication channels. Overcoming these hurdles requires building capacity, providing adequate resources, and establishing clear communication, using appropriate simple data analysis tools, and fostering an inclusive environment where all stakeholders feel empowered to contribute.

Involving community members in the analysis of monitoring and evaluation data builds a sense of ownership over the project. This participation increases the likelihood that communities will continue to support and maintain the irrigation systems even after external support ends, leading to more sustainable outcomes. Participatory data analysis allows for the identification of community-specific needs, challenges, and successes. This input is vital for improving the design of irrigation projects and making necessary adjustments during their implementation, ensuring they are more relevant and effective.

When communities are active participants in data analysis, they become more accountable for the project's success and the efficient use of resources. This shared responsibility strengthens the accountability of both the community and the project management. Studies show that participatory M&E has a statistically significant positive impact on project performance across various sectors, including water and agriculture. Researching this link provides evidence of how this approach leads to improved project performance in community-based irrigation.

Data analysis involving the community can highlight how resources are being used and identify areas where efficiency can be improved. This ensures that limited resources are used effectively, maximizing the benefits of the irrigation project. Primary stakeholders, including beneficiaries, participate in deciding what data is relevant, how it's analyzed, and what the results mean. Participants work together to understand and interpret data, creating shared knowledge and fostering collective learning about the project's performance. Instead of being passive recipients of information, participants gain control over the M&E process and its outcomes, leading to greater ownership and motivation.

Participatory Utilization of M&E Findings and Performance of community- based irrigation projects

Participatory utilization of M&E findings involves a collaborative process where various stakeholders, including program participants and community members, are actively involved in collecting, analyzing, reflecting on, and acting upon M&E results to guide decision-making and corrective actions for improved program outcomes. This approach enhances accountability, fosters ownership, builds local capacity, and generates more inclusive, context-specific learning compared to traditional top-down M&E models.

Investigating the link between Participatory M&E findings and community-based irrigation project performance is crucial because it reveals how community involvement in monitoring and evaluation (M&E) leads to improved project sustainability, greater accountability, enhanced resource efficiency, and increased community ownership. By understanding this relationship, stakeholders can develop more effective, community-driven approaches, leading to better-managed, sustainable, and more impactful irrigation projects that truly meet the needs of the community.

When communities participate actively in using M&E findings, they feel a greater sense of ownership and empowerment, which translates into more effective project management and increased support for the project even after it ends. The process of using M&E findings collaboratively fosters accountability among project teams and the community, ensuring that resources are used effectively and that the project remains aligned with community goals.

M&E findings highlight areas of inefficiency or underperformance, allowing for informed decisions on how to better allocate limited resources to address critical needs and improve overall project effectiveness. The participatory use of M&E findings encourages a collaborative environment between project implementers and community members, improving communication and building stronger partnerships essential for project success.

Challenges in achieving participatory utilization of M&E findings in Community-Based Irrigation Projects in developing countries like Kenya include inadequate capacity and resources, which limit technical expertise and funding for engagement; lack of effective M&E training among community members and institutions; weak institutional frameworks and lack of coordinated approaches; power imbalances and interference from local leaders; and logistical and communication barriers like poor infrastructure and illiteracy. Addressing these requires comprehensive training, increased funding, improved governance, and tailored M&E approaches that empower local communities.

To improve the participatory utilization of M&E findings in Community-Based Irrigation Projects, involve communities in all phases of M&E by using accessible tools like focus groups and participatory mapping, ensure findings are communicated effectively, foster ownership through joint analysis and decision-making, and integrate the findings into project planning and adaptive management to demonstrate tangible community benefits and promote long-term support.

Performance of Community- Based Irrigation Projects

Project performance refers to how well a project achieves its goals and objectives, considering factors like time, cost, scope, and quality. It's essentially a measurement of a project's success, both in terms of its intended outcomes and the efficiency of its execution. Effective project performance management ensures projects stay on track, meet stakeholder expectations, and contribute to organizational goals.

The performance of Community-Based Irrigation Projects refers to how effectively they achieve their goals, often assessed by irrigation efficiency, water productivity, economic returns (income, jobs), and social benefits (food security, community empowerment). Poor performance is indicated by low efficiency and productivity due to issues like poor infrastructure, inadequate management, and lack of training, which can lead to unreliable water supply and reduced crop yields.

Researching community-based irrigation project performance is vital for Kenya to enhance food security, improve livelihoods, mitigate climate change impacts, and promote sustainable agricultural practices. By understanding what works and what doesn't, policymakers and communities can improve water management, strengthen governance, and ensure that these projects effectively contribute to Kenya's development goals by boosting food production and farmer incomes in an increasingly challenging climate.

The performance of Community-Based Irrigation Projects is vital for Kenya because it is a primary mechanism for achieving national food security, enhancing household incomes, creating jobs, and mitigating climate change impacts. Given Kenya's heavy reliance on vulnerable rain-fed agriculture and increasing climate shocks like droughts, well-performing irrigation schemes provide a reliable and sustainable source of water, which in turn boosts agricultural productivity, reduces poverty, and contributes significantly to the national economy and the government's Bottom-Up Transformation Agenda.

Effective irrigation ensures a consistent and reliable supply of water, enabling consistent crop production, especially in regions with erratic rainfall and frequent droughts, thereby directly addressing food insecurity and improving nutritional status. Improved agricultural productivity from successful irrigation projects leads to increased incomes for farmer households, supports

diverse livelihood activities, and contributes to the national economy through agricultural output and potential export earnings.

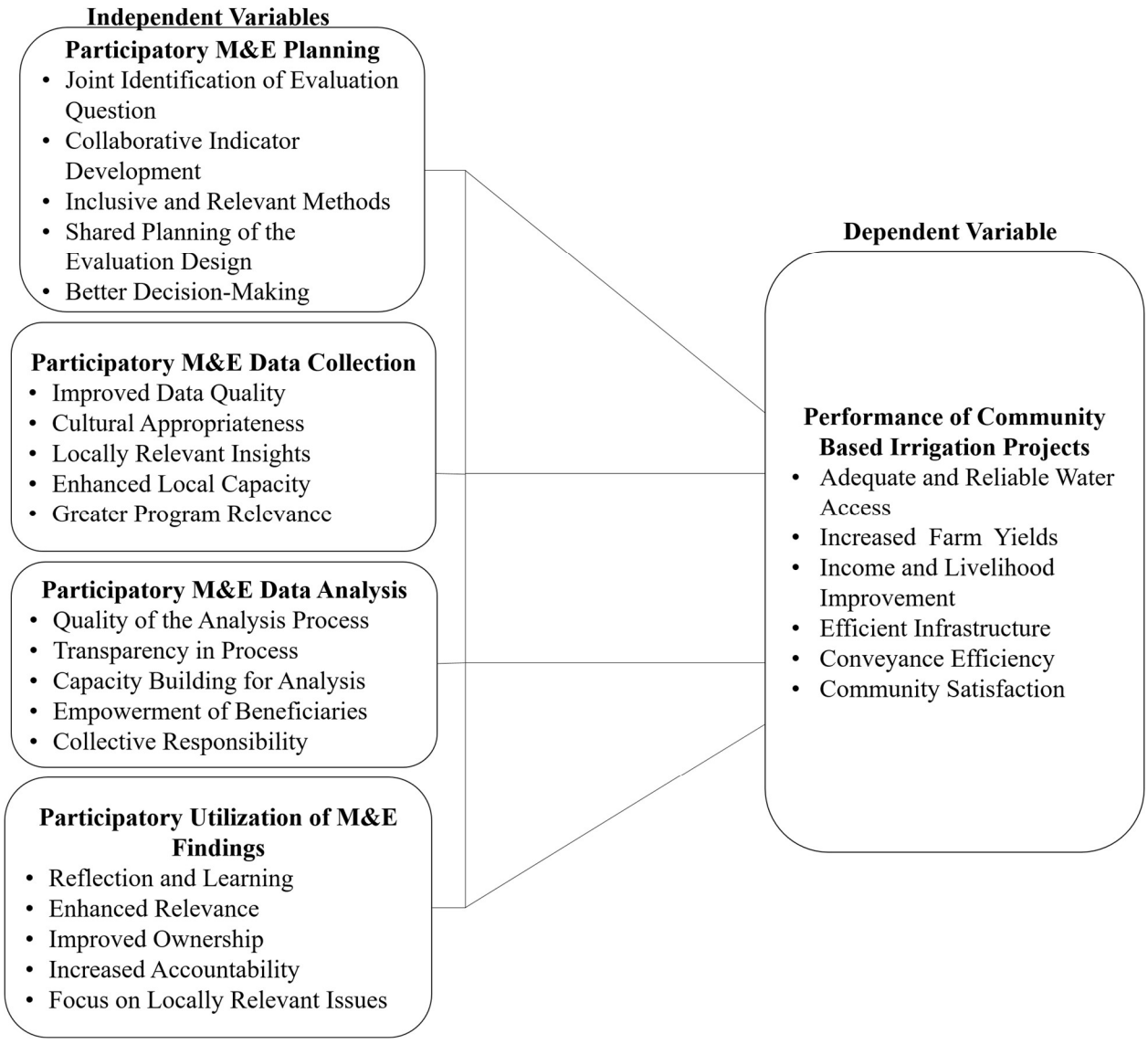
By reducing dependence on rain-fed agriculture, which is highly vulnerable to extreme weather events, high-performing irrigation projects help communities adapt to and mitigate the impacts of climate change, promoting long-term sustainability. Enhanced productivity and incomes at the household level, particularly in arid and semi-arid (ASAL) regions, directly contribute to poverty reduction efforts and improve the overall livelihoods of marginalized communities.

Well-performing irrigation schemes create and sustain employment opportunities within the agricultural sector and related value chains, fostering local economic development and self-sufficiency. Boosting the performance of these projects aligns with the Kenyan Government's Bottom-Up Transformation Agenda, which emphasizes food security, economic revitalization, and sustainable resource management through initiatives like the National Irrigation Sector Investment Plan (NISIP).

Factors hindering optimal performance of Community-Based Irrigation Projects in Kenya include technical issues like water scarcity, poor infrastructure, and outdated technology; socio-economic challenges such as high costs, lack of finance, and inaccessible markets; and institutional weaknesses like poor management, inadequate farmer organizations, and unreliable land tenure. Climate change, soil degradation, limited access to technical knowledge, and weak links with a functional rural economy also contribute significantly to poor performance.

Improving community-based irrigation in Kenya requires a multifaceted approach, including enhancing farmer capacity through technical training and access to inputs like certified seeds and fertilizers, optimizing water management with technologies like solar-powered pumps and digitization, developing market linkages and supporting value addition for produce, modernizing infrastructure, fostering public-private partnerships, and ensuring robust governance and stakeholder engagement through strategic planning and communication

Conceptual Framework



METHODOLOGY

This section presents the research philosophy, design, population of study, sample Size and sampling methods, data collection instruments, validity and reliability of data collection instruments, operationalization of study variables, and data analysis methods.

Research Philosophy

This study is grounded on Positivism. Positivism, as a research philosophy, emphasizes the use of scientific methods to study the social world, focusing on observable and measurable data to establish objective truths (Dulal, 2025; Park, Konge & Artino Jr, 2020). It assumes that a single, objective reality exists and can be understood through systematic observation and analysis, often

using quantitative methods. Positivism provides a framework for conducting research that emphasizes objectivity, measurability, and the application of scientific principles to understand the social world (Dulal, 2025; Park, Konge & Artino Jr, 2020).

Using a positivism research philosophy is important in this investigation because it emphasizes objective, quantifiable data to establish causal relationships between participatory monitoring and evaluation (PM&E) practices and the implementation of school-based peace education programs. This objective approach allows for generalizable inferences, and replication to identify the most effective strategies, providing evidence-based insights for policymakers, educators, and program implementers to improve peace education programs.

Research Design

This study adopted an explanatory sequential mixed methods design (Subedi, 2016; Toyon, 2021). The study was carried out in two distinct phases: the first phase involved collecting and analyzing quantitative data, followed by a second phase where qualitative data was gathered and analyzed to explain, elaborate on, or provide more in-depth context for the initial quantitative findings.

The design offers deeper insights into the "how" and "why" by first providing a broad quantitative overview of how participatory monitoring and evaluation (M&E) influences peace education programs, followed by in-depth qualitative exploration to explain the observed relationships and underlying processes (Subedi, 2016; Toyon, 2021). Explanatory sequential mixed methods design allows for the development of a comprehensive understanding that goes beyond either method alone, enabling this study to identify factors contributing to or hindering peace program implementation and to understand the experiences of stakeholders involved**.**

Population of Study

The target population for this study is 12 Community-Based Irrigation Projects in 7 Counties in Western Kenya.

Table 1.1: Target Population

County in Western Kenya	**No. of Community Based Irrigation Projects**	**Total No. of Community Based Irrigation Projects**	**Target Respondents**
Kisumu County	3 (Ahero Irrigation Scheme, West Kano Irrigation Scheme and Chiga Rice Irrigation Scheme)	3	3 Project managers, 3 M&E Officers, 15 Small Holder Farmer Group Officials **Total=21**
Busia County	2 (Bunyala Irrigation Scheme, Lower Nzoia Irrigation Project)	2	2 Project managers, 2 M&E Officers, 10 Small Holder Farmer Group Officials **Total=14**
Homa Bay County	2 (Oluch Kimira Project, Gorogoro Irrigation Project)	2	2 Project managers, 2 M&E Officers, 12 Small Holder Farmer Group Officials **Total=16**
Migori County	1 (Lower Kuja Irrigation Scheme)	1	1 Project managers, 1 M&E Officers, 8 Small Holder Farmer Group Officials **Total=10**
Vihiga County	2 (Buhani Irrigation Scheme,	2	2 Project managers, 2 M&E

	Luanda Irrigation Project)		Officers, 10 Small Holder Farmer Group Officials **Total=14**
Kakamega County	4 (Navakholo Irrigation Development Project; Mukongolo Project; Idakho North irrigation project; Savona Water Project)	4	4 Project managers, 2 M&E Officers, 20 Small Holder Farmer Group Officials **Total=26**
Siaya County	2 (Lower Nzoia Irrigation Project / Bunyala Irrigation Scheme; Anyiko Ujwanga Katheino Irrigation Project)	2	2 Project managers, 2 M&E Officers, 12 Small Holder Farmer Group Officials **Total=10**
7 Counties		**12**	**111**

Source: The County Governments, 2025 Records

Sample Size and Sampling Methods

This study employed a census to collect data from the entire target population of 111 individuals from 12 Community-Based Irrigation Projects in Western Kenya. The population of 111 respondents was considered the manageable and complete group of project participants directly involved in the projects' M&E processes. As data was collected from every individual within this defined population, no sampling was required.

Data Collection Instruments

Data was collected using a 5-Likert scale questionnaire (Davis, Rhind & Jowett, 2025; Salim & Azo, 2025) delivered via WhatsApp for quantitative data, and a separate interview guide for qualitative data gathered through in-depth conversations (Panyasai & Ambele, 2025; Westland, Vervoort, Kars, & Jaarsma, 2025), also conducted via WhatsApp for continuity and familiarity with the messaging platform. This hybrid approach allows for both scalable, structured data collection and rich, and contextualized insights into respondents' experiences, leveraging WhatsApp's familiarity and cost-effectiveness while mitigating some limitations through a complementary qualitative method. For primary analysis, the 5-point ordinal scale was transformed statistically to ensure that the distance between each category of response is equidistant. The qualitative interpretation of the 5-point Likert scale measures employed in this study adopted categorization as per Nyutu (2021) which recommended that: a point range of 1.00 - 1.80 for strongly disagree, 1.81-2.60 for Disagree, 2.61-3.40 for Neutral, 3.41-4.20 for Agree and 4.21- 5.00 for Strongly agree

Validity of Data Collection Instruments

Both content and construct validity (Hossan, Wolfs & Petkovic, 2025; Ljevaković-Musladin, 2024 was assured in this study. To ensure construct validity, a comprehensive conceptual framework was developed that clearly operationalizes and defines the study variables (Hossan, Wolfs & Petkovic, 2025; Ljevaković-Musladin, 2024).

To ensure content validity, the supervisor, who is subject-matter expert in monitoring and evaluation reviewed the Likert scale questionnaire and interview guide to assess if their contents adequately cover the constructs' dimensions by rating each item on a scale of very relevant (4), relevant (3), somewhat relevant (2), and not relevant (1). Content Validity Index (CVI) was used to determine validity.

$$CVI = \frac{Sum\ of\ item\ rated\ 3\ or\ 4}{Number\ of\ Quetionnaire\ items}$$

CVI= Items rated 3 or 4 by both experts divided by the total number of items in the questionnaire. The results summarized in Table 1.2 were obtained.

Table 1.2: Experts Rating of Instruments

Supervisor I Rating	Frequency (n)
1	2
2	4
3	19
4	25
Total	**50**

Table 1.2 shows that validity index: CVI= (19+25)/50= 0.880, which is acceptable since it was more than the threshold of 0.7 recommended by Cohen and Swerdlik (2010). Hence out of any ten items used in this study, at least seven of them measured what they were intended to measure. Construct validity was evaluated by examining whether a consistent significant proportion of high scores in items investigating independent variables correlated positively or negatively with scores in items investigating the dependent variable. This was done by comparing several scores from different subjects.

Reliability of the Research Instruments

The reliability of the research instruments was established to ensure their consistency in yielding similar results when repeatedly applied to the same target population. A pilot study was conducted to confirm this reliability. The stability of the instruments over time was determined using a pre-test reliability method. Subsequently, a re-test was performed on the corrected questionnaire to ensure it met the recommended reliability threshold of $\alpha \geq 0.70$, as suggested by Cronbach and Azuma (1962), before being used in the main study.

The study utilized Cronbach's alpha coefficient to assess the reliability of the rating-scaled questionnaire. Items were carefully reviewed and deleted as necessary to maximize their reliability coefficient. The resulting coefficients were then compared against a threshold of $\alpha \geq 0.70$, which is the recommended coefficient test for reliability according to Cohen and Swerdlick (2010). The reliability output results are presented in Table 1.3

Table 1.3: Reliability output results

Scale	No. of Items	Alpha
Participatory M&E Planning	10	0.875
Participatory M&E Data Collection	10	0.899
Participatory M&E Data Analysis	10	0.786
Participatory M&E Results	10	0.779

Utilization		
Performance of Community Based Irrigation Projects	10	0.792
Overall	50	0.826

The reliability of the research instruments was a crucial step to ensure the study's findings were consistent and trustworthy. A pilot study was conducted to confirm that the questionnaires would produce stable results if administered multiple times. The study used Cronbach's alpha coefficient to measure internal consistency, which determines how closely related a set of items are as a group. A Cronbach's alpha of 0.70 or higher is generally considered acceptable for research purposes.

As shown in Table 1.3, the reliability analysis yielded strong results across all scales. The overall Cronbach's alpha was 0.826, which is well above the 0.70 threshold. This indicates a high level of reliability for the entire instrument, which comprised a total of 50 items. The consistently high alpha values across all scales confirm that the research instruments were reliable and suitable for data collection in this study the influence of participatory M&E practices and the Performance of Community Based Irrigation Projects

Data Analysis Methods

This study employed descriptive and inferential statistics to analyze data. Descriptive statistics involved quantitative and qualitative data analysis while inferential statistics involved testing of research hypotheses using correlation and regression analysis. These are further explained in detail in the following sub-sequent sub-themes:

Descriptive Statistics

Descriptive statistics describes and summarizes data into distribution of scores or measurements such as measures of central tendency, measures of dispersion, frequencies and percentages and tables.

In quantitative data, the data was collected on each independent variable and dependent variable which are the subject of investigation. It contained a total of 54 items comprising of 4 items in the demographic characteristics section and each of the 5 variables having 10 items structured to generate Likert response options measured on a 5-point ordinal scale ranging from the lowest score “1” strongly disagree (SD) to the highest score “5” strongly agree (SA).

In qualitative data, the data from interview guide was recorded appropriately for further processing based on themes. Responses were coded and analyzed for themes and compared to the variables to validate quantitative results. Data was summarized into daily briefs after each interview sessions. This was followed by description of the responses to produce an interim report on areas that require additional information and requisite data sourced for systematic analysis and interpretation.

Inferential Statistics

Pearson correlation co-efficient was used to test relationship between the independent variables and dependent variable, in order to reject or fail to reject the null hypothesis. The null hypotheses were tested for significance at $\alpha=0.05$ significance level. Sekaran’s (2006) decision criterion, according to which the Null Hypothesis is to be rejected is if P-value < 0.05; or otherwise, it is

accepted. Using the Pearson correlation p-values under 2-tailed, the following five hypothesis were tested:

Model 5 for Hypothesis5; $H0_5$; There is no significant relationship between the joint project planning approaches and Performance of Community-Based Irrigation Projects

Joint project planning approaches = *f* (joint project planning approaches, random error).

$Y_j=\beta_{0+} \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon_i$

Where;

β_0- Population's regression constant,

$X_=$ (joint project planning approaches

ε -is the Model error variable.

Simple and multiple regression model was used to make predictions or inferences about the population of study from observations and analyses of a sample. More specifically, the hierarchical multiple regression models advanced by Baron and Kenny (1986) were used to establish the statistical significance of the relationships between the independent, moderating variables, intervening and dependent variable.

Summary of Tests of Hypotheses

To arrive at empirical conclusions, tests of various hypotheses were conducted at α=0.05 significance level. For P<0.05, H0 is rejected and H_A is accepted. Table 1.4 indicate the summary of the research hypothesis, decision rule and the interpretation of the expected results.

Table 1.4: Statistical Tests of Hypotheses

Objective	**Hypothesis**	**Tools of Analysis**	**Analysis model**	**When to accept or reject**
To assess the combined effect of participatory monitoring and evaluation practices on performance of community- based irrigation projects in Western Kenya.	$H0_6$ There is no significant relationship between the combined participatory monitoring and evaluation practices and performance of Community-Based Irrigation Projects in Western in Kenya	Multiple Linear Regression analysis	$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \varepsilon$	*P-Value*>0.05 do not Reject *P-Value* ≤0.05 Reject

Table 1.5: Operationalization of Study Variables

Objectives	**Variables**	**Indicators**	**Scale of Measurement**	**Research Approach**	**Types of Statistical Analysis**	**Tools of Data Analysis**
To assess the combined effect of participatory monitoring and evaluation practices on performance of Community-Based Irrigation Projects in Western Kenya.	Independent Variable: Combined Participatory M&E Practices	A composite score reflecting planning, data collection, analysis, and utilization practices	Interval	Quantitative	Descriptive statistics, Multiple linear regression	SPSS
Performance of Community-Based Irrigation Projects	Dependent Variable:	Crop yield increase Water use efficiency Project sustainability and maintenance Improved community well-being Farmer income increase	Interval			

FINDINGS

This section presents the study's results, which are discussed in a cross-sectional manner across several thematic areas: questionnaire return rate, participants' demographic characteristics, and the four key components of participatory monitoring and evaluation practices as they relate to Performance of community- based irrigation projects in Western Kenya. This final thematic area combines these Participatory Monitoring and Evaluation Practices to examine their overall effect. The objectives were also analyzed using descriptive statistics, but the inferential analysis progressed to correlation analysis and multiple regression analysis to test for significant relationships. All statistical analyses were discussed simultaneously to provide a comprehensive

and integrated view of the findings.

The key informant interviews, a qualitative data collection method, provided insights that were integrated with the quantitative descriptive statistics from the questionnaires. This triangulation of both qualitative and quantitative data enhanced the validity and reliability of the study's findings.

Questionnaire Return Rate

From a census of the entire target population of 111 individuals, 111 questionnaires were issued to study participants. All 111 questionnaires were fully completed and returned, resulting in a 100% response rate. This is further detailed in Table 1.6.

Table 1.6: Questionnaire Return Rate

Respondent	Population	Returned	Return rate
Number	111	111	100%

Based on the revised Table 1.6, the study achieved an excellent questionnaire return rate, indicating a highly successful data collection process.

From a target population of 111 individuals, 111 questionnaires were issued, and all were fully completed and returned. This yielded a 100% return rate, as detailed in Table 4.1. This exceptional rate, which far exceeds the acceptable threshold of 50% commonly cited by research methodologists like Mugenda and Mugenda (2003) and Kothari (2004), was achieved through diligent follow-up. This perfect return rate ensures that the collected data is a complete representation of the study's population, thereby eliminating any risk of non-response bias.

Demographic characteristics of Community-Based Irrigation Projects in Western Kenya

The demographic profile of 111 respondents was necessary mainly because it serve as a foundational context for understanding the key characteristics of the study participants in relation to current study. Data were systematically collected on key variables related to respondent' roles in Community Based Irrigation Projects, The Years respondent Started Implementing Community Based Irrigation Projects, Funding Sources for the Community Based Irrigation Projects context and approaches Used in Community Based Irrigation Projects as presented in Table 1.7

Table 1.7: Characteristics of Community-Based Irrigation Projects in Western Kenya

Characteristics	n(f) frequency	(%) percent
Position/Role in Project (Multiple Responses Allowed)		
Project Manager	5	4.5%
M&E Officer (Using M&E Specialist figure)	3	2.7%
Smallholder Farmer Group Official (Using Member Irrigation Water Users Association figure)	45	40.5%
County Irrigation Officer (Using Technical Expert and Extension Officer	12	10.8%

Characteristics	n(f) frequency	(%) percent
figures)		
Technical Extension Officer (Covered above)		
Community Leader	10	9.0%
NGO Representative (Using NGOs and Development Partner figure)	3	2.7%
Other (Using Farmer, Private Sector Partner, and Other figures)	33	29.7%
Total	**111**	**100.0%**
Years Implementing Projects		
2010 – 2013	12	10.8%
2014 – 2016	20	18.0%
2017 – 2019	35	31.5%
2020 – 2022	28	25.2%
2023 - Present (Using 2022-Present figure)	16	14.4%
Total	**111**	**100.0%**
Funding Sources (Multiple Responses Allowed)		
County Government Budget (Using County Government Revenue figure)	20	18.0%
National Government (e.g., State Department for Irrigation) (Using National Government Revenue figure)	25	22.5%
Donor Funding (e.g., World Bank, USAID) (Using Official Development Assistance (ODA) figure)	18	16.2%
NGO Support (Using Development Partners figure)	15	13.5%
Farmer Contributions (Derived from 'Other Sources' and 'Innovative Financing' from original table)	15	13.5%
Public-Private Partnerships	8	7.2%
Other (Using Bilateral and Multilateral Agreements figure)	10	9.0%
Total	**111**	**100.0%**
Main Components Addressed (Multiple Responses Allowed)		
Water Intake and Canals (Using Surface and Sprinkler Irrigation figures)	55	49.5%
Pump Stations and Drip Systems (Using Drip and Centre Pivot Irrigation figures)	25	22.5%
Soil and Water Conservation (Using Sub-irrigation and Manual Irrigation figures)	17	15.3%
Farmer Training and Capacity Building (Using Capacity Building figure)	5	4.5%
Market Linkages (Derived from 'Policy Coordination' figure)	5	4.5%
Conflict Resolution Mechanisms (Derived from 'Data Harmonization' figure)	4	3.6%
Other	0	0.0%
Total	**111**	**100.0%**

Based on the data presented in the Table 1.7, the following implications can be drawn regarding the characteristics of the irrigation projects and their potential relationship with participatory M&E practices.

Performance of Community- based Irrigation Projects

Performance of community- based irrigation projects in Western Kenya served as the dependent variable in this study. Building on both theoretical and empirical frameworks, the study identified six key indicators of Performance of community- based irrigation projects: adequate and reliable water access, increased farm yields, income and livelihood improvement, efficient infrastructure, conveyance efficiency and community satisfaction. To measure these indicators, participants responded to a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

For primary data analysis, this ordinal scale was statistically transformed into an equidistant, or interval, scale to meet the assumptions of the parametric statistical methods used in the study. The qualitative interpretation of the results followed Nyutu's (2021) categorization, where mean scores were interpreted as follows: a point range of 1.00 - 1.80 for strongly disagree, 1.81-2.60 for Disagree, 2.61-3.40 for Neutral, 3.41-4.20 for Agree and 4.21- 5.00 for Strongly agree.

The data was then analyzed and presented using descriptive statistics, including frequencies, percentages, means, and standard deviations for each item. Both individual item means and standard deviations, as well as composite means and standard deviations, were calculated and presented in Table 1.8

Table 1.8: Performance of Community- based Irrigation Projects

STATEMENTS	SA	A	N	D	SD	Mean	Std. dev	skewnes
1 Community based irrigation projects contribute to enhanced food security at both the household and community levels	21(18.9%)	53(47.8%)	20(18%)	17(15.3%)	0(0.00%)	3.70	0.950	-0.472
2. Community based irrigation projects create new jobs in farming and related sectors, both on and off the farm.	27(24.4%)	43(38.7%)	35(31.5%)	6(5.4%)	0(0.00%)	3.82	0.865	-0.154
3. Community based irrigation projects benefit women farmers by reducing their workload and providing them with more time for other activities.	29(26.1%)	49(44.2%)	23(20.8%)	10(9.0%)	0(0.00%)	3.87	0.906	-0.494
4.Community based irrigation projects make agriculture more resilient to climate change by reducing dependence on rainfall.	34(30.7%)	51(45.%9)	24(21.6%)	2(1.8%)	0(0.00%)	4.05	0.773	-0.334
5. Community based irrigation projects ensures sustainable water use and minimizes environmental impact.	23(20.8%)	43(38.7%)	43(38.7%)	2(1.8%)	0(0.00%)	3.78	0.791	-0.383
6.Community based irrigation projects helps households escape poverty.	23(20.8%)	52(46.8%)	22(9.8%)	10(9%)	4(3.6%)	3.78	1.01	-0.811
7.Community based irrigation projects allows for multiple cropping seasons and higher yields.	58(52.3%)	37(33.3%)	16(14.4%)	0(0.00%)	0(0.00%)	4.38	0.729	-0.723

8. Community based irrigation projects ensure that water is distributed fairly among all farmers.	35(31.5%)	42(37.9%)	20(18%)	10(9.0%)	4(3.6%)	3.85	1.08	-0.834
9.Community based irrigation projects lead to increased social capital and improved community cohesion.	50(45%)	34(30.7%)	13(11.7%)	6(5.4%)	8(7.2%)	4.01	1.20	--1.23
10. Community based irrigation projects improve the livelihoods of farmers and their families..	75(67.6%)	34(30.6%)	2(1.8%)	0(0.00%)	0(0.00%)	4.66	0.513	-1.08
Composite mean & Composite standard deviation						**3.99**	**0.930**	

Based on the provided Table 1.8, the results indicate that Community-Based Irrigation Projects are perceived very positively by respondents. The data shows a general consensus that these projects are performing well across multiple indicators. The composite mean for project performance is 3.99, with a composite standard deviation of 0.930.

This high composite mean, falling between "Agree" and "Strongly Agree," signifies that respondents generally have a strong, positive perception of the projects' performance. The low composite standard deviation suggests a high degree of consensus among respondents. Similarly, ten statements were developed to measure the extent of Performance of community- based irrigation projects in Western Kenya

Statement 1: "*Community based irrigation projects contribute to enhanced food security at both the household and community levels*." With a mean of 3.70 and 66.7% agreement (18.9% strongly agreed, 47.8% agreed), respondents agreed that these projects contribute to food security. This implies that the projects are perceived as having a significant positive impact on the availability and access to food within the communities they serve. The standard deviation of 0.950 (greater than the composite) indicates a divergence of opinion among respondents. This may reflect varying levels of impact on food security across different households or communities.

Statement 2: *"Community based irrigation projects create new jobs in farming and related sectors, both on and off the farm."* With a mean of 3.82 and 63.1% agreement (24.4% strongly agreed, 38.7% agreed), respondents believed that these projects create jobs. This implies that the implementation of irrigation projects has a tangible, positive effect on local employment, both directly in agriculture and in related economic activities. The standard deviation of 0.865 (less than the composite) indicates a high degree of consensus among respondents on this point.

Statement 3: *"Community based irrigation projects benefit women farmers by reducing their workload and providing them with more time for other activities*." With a mean of 3.87 and 70.3% agreement (26.1% strongly agreed, 44.2% agreed), respondents agreed that the projects benefit women. This implies that the projects are perceived as having a positive social impact, specifically by easing the burdens on women farmers and promoting their participation in other activities. The standard deviation of 0.906 (less than the composite) shows a strong convergence of opinion on this benefit.

Statement 4: *"Community based irrigation projects make agriculture more resilient to climate change by reducing dependence on rainfall."* With a mean of 4.05 and 76.6% agreement (30.7% strongly agreed, 45.9% agreed), respondents agreed that the projects enhance climate resilience. This implies that the projects are seen as a critical strategy for adapting to climate variability and ensuring agricultural stability. The standard deviation of 0.773 (less than the composite) indicates a high degree of consensus on this key benefit.

Statement 5: "*Community based irrigation projects ensures sustainable water use and minimizes environmental impact."* With a mean of 3.78 and 59.5% agreement (20.8% strongly agreed, 38.7% agreed), respondents perceived the projects as environmentally sound. This implies that the projects are generally viewed as being managed in a way that promotes sustainable practices, which is crucial for long-term agricultural success. The standard deviation of 0.791 (less than the composite) shows a convergence of opinion on this issue.

Statement 6: *"Community based irrigation projects helps households escape poverty."* With a mean of 3.78 and 67.6% agreement (20.8% strongly agreed, 46.8% agreed), respondents agreed that the projects help reduce poverty. This implies that the economic benefits generated by the projects are perceived as significant enough to help households improve their financial situation. The standard deviation of 1.01 (greater than the composite) indicates a divergence of opinion, which may reflect different levels of income and poverty reduction experienced by households.

Statement 7: *"Community based irrigation projects allows for multiple cropping seasons and higher yields."* With a mean of 4.38 and 85.6% agreement (52.3% strongly agreed, 33.3% agreed), respondents overwhelmingly agreed on this outcome. This implies that the projects have been highly successful in achieving a primary goal of irrigation, which is to increase agricultural productivity and output. The standard deviation of 0.729 (less than the composite) shows a strong convergence of opinion, confirming this is a widely experienced benefit.

Statement 8: "*Community based irrigation projects ensure that water is distributed fairly among all farmers."* With a mean of 3.85 and 69.4% agreement (31.5% strongly agreed, 37.9% agreed), respondents agreed that water distribution is fair. This implies that project governance and management structures are largely effective in ensuring equitable access to water, a key factor in preventing conflicts. The standard deviation of 1.08 (greater than the composite) indicates a divergence of opinion, which may reflect isolated instances of perceived unfairness in water allocation.

Statement 9: *"Community based irrigation projects lead to increased social capital and improved community cohesion*." With a mean of 4.01 and 75.7% agreement (45% strongly agreed, 30.7% agreed), respondents agreed that the projects build social capital. This implies that the projects are perceived as more than just an agricultural tool, but also as a means to foster stronger community bonds and collaboration. The standard deviation of 1.20 (greater than the composite) indicates the highest divergence of opinion among all statements, which may reflect varying experiences with community dynamics.

Statement 10: *"Community based irrigation projects improve the livelihoods of farmers and their families."* With a mean of 4.66 and an impressive 98.2% agreement (67.6% strongly agreed, 30.6%

agreed), respondents overwhelmingly agreed on this statement. This implies that livelihood improvement is the most significant and widely recognized benefit of the projects. The standard deviation of 0.513 (less than the composite) indicates an exceptionally high degree of consensus among respondents on this key outcome.

These findings were also corroborated by the key informants during the interview session who had this to say in line with their experiences with the performance of Community-Based Irrigation Projects:

‘’The most significant benefit of these irrigation projects has been the dramatic improvement in our livelihoods and food security," said K-006. Before the projects, we were entirely dependent on rainfall, which made farming a high-risk activity with low and unpredictable yields. With a reliable water source, we can now farm year-round, allowing for multiple cropping seasons and a wider variety of crops. This hasn't just increased our income; it's ensured a consistent food supply for our families and communities. The increased yields have created a ripple effect, leading to more employment opportunities and a more vibrant local economy. This all aligns with what the data shows for increased yields and improved livelihoods." said K-006

"However, even with the clear economic benefits, some challenges in project management still persist," added K-004. "For instance, water distribution isn't always fair, and we've had some conflicts over water sharing, especially during dry periods. While we have water committees, without strong leadership and transparent rules, these disagreements can undermine the community cohesion the projects are meant to build. We need to work on stronger governance and more effective ways to resolve conflicts to ensure water use is both equitable and sustainable. Our next step is to make sure all farmers are actively involved in this process, which is crucial for the projects' long-term success."

The Joint Influence of Participatory Monitoring and Evaluation Practices on Performance of Community- Based Irrigation Projects

The study sought the perspectives of study participants on the joint effect of Participatory Monitoring and Evaluation Practices on Performance of community- based irrigation projects. This was the fifth objective the study sought to establish. The results are presented in Table 1.9.

Table 1.9: The Joint Influence of Participatory Monitoring and Evaluation Practices on Performance of Community- Based Irrigation Projects

Joint effect of Participatory Monitoring and Evaluation Practices	n	Mean	Standard deviation
Participatory M&E Planning	111	3.67	1.11
Participatory M&E Data Collection	111	3.84	1.04
Participatory M&E Data Analysis	111	3.77	1.10
Participatory M&E Results Utilization.	111	3.89	1.03
Composite mean & standard deviation	**111**	**3.79**	**1.07**

The results from Table 1.9 consistently demonstrate a strong positive perceived joint effect of

Participatory Monitoring and Evaluation Practices on the Performance of Community-Based Irrigation Projects. All four factors—Participatory M&E Planning, Participatory M&E Data Collection, Participatory M&E Data Analysis, and Participatory M&E Results Utilization — show high mean scores, underscoring their significant contribution.

The composite mean for these factors is 3.79, with a standard deviation of 1.07, confirming their overall positive impact. Individually, Participatory M&E Results Utilization has the highest mean score of 3.89 (standard deviation 1.03), indicating it's considered the most influential factor. This is followed by Participatory M&E Data Collection with a mean of 3.84 (standard deviation 1.04), Participatory M&E Data Analysis with a mean of 3.77 (standard deviation 1.10), and Participatory M&E Planning with a mean of 3.67 (standard deviation 1.11). These findings imply that a comprehensive and participatory approach to monitoring and evaluation is critical for the successful performance of Community-Based Irrigation Projects. The high mean scores for all factors indicate that stakeholders have a strong foundation in these practices, which directly influences the projects' effectiveness. This provides a solid groundwork for future interventions and policy development aimed at enhancing project outcomes.

Correlation Analysis of the Joint Influen*ce* of Participatory Monitoring and Evaluation Practices on Performance of community- based irrigation projects

In order to determine the correlation between the Joint Influence of Participatory Monitoring and Evaluation Practices on Performance of community- based irrigation projects. Pearson correlation coefficient was run on the scores of each scale. The respondent at 95% level of confidence computed the total scores of the scales as a summation of the individual scores on each item. The results obtained are indicated in Table 1.10.

Table 1.10: Correlation Analysis of the Joint Influence of Participatory Monitoring and Evaluation Practices on Performance of community- based irrigation projects

Joint Influence of Participatory Monitoring and Evaluation Practices		**Performance of community- based irrigation projects**
Participatory Monitoring and Evaluation Planning	*Pearson Correlation*	0.474*
	Sig. (2-tailed)	0.000
	n	111
Participatory M&E Data Collection	*Pearson Correlation*	0.614*
	Sig. (2-tailed)	0.000
	n	111
Participatory M&E Data Analysis	*Pearson Correlation*	0.370
	Sig. (2-tailed)	0.000
	n	111
Participatory M&E Results Utilization.	*Pearson Correlation*	0.611
	Sig. (2-tailed)	0.000
	n	111

Overall Joint Influence of Participatory Monitoring and Evaluation Practices	*Pearson Correlation*	0.716*
	Sig. (2-tailed)	0.000
	n	111

*Significant at 0.05 level (2-tailed)

Table 1.10 presents the results of a correlation analysis examining the relationship between various participatory monitoring and evaluation (M&E) practices and the performance of Community-Based Irrigation Projects. The data reveals a statistically significant positive linear relationship between each M&E practice and project performance, as well as for their overall combined influence.

The correlation coefficients (r) indicate a positive association for each M&E component:

Participatory M&E Planning: r=0.474, Participatory M&E Data Collection: r=0.614, Participatory M&E Data Analysis: r=0.370 and Participatory M&E Results Utilization.: r=0.611

The relationships for data collection and utilization of findings show a stronger association with project performance compared to the other two factors. All individual correlations are statistically significant, with a p-value of 0.000 ($p < 0.05$), suggesting these relationships are not due to random chance. The combined effect of all four participatory M&E practices shows a very strong positive correlation (r=0.716) with the performance of Community-Based Irrigation Projects. This indicates that while each practice individually contributes to project success, their joint influence is substantially more impactful.

With a consistently low p-value of 0.000 for the overall correlation, the null hypothesis of no relationship was rejected and it was concluded that there is a significant, strong relationship between the joint influence of participatory M&E practices and the performance of Community-Based Irrigation Projects.

Regression Analysis of Joint Influence of Participatory Monitoring and Evaluation Practices on Performance of Community- Based Irrigation Projects

Multiple linear regressions were adopted to investigate the Joint Influence of participatory M&E practices on performance of Community-Based Irrigation Projects. It was necessary to get the views of the study participants on the effect of Joint Influence of participatory M&E practices on performance of Community-Based Irrigation Projects

Model summary of Joint Influence of participatory M&E practices on performance of Community-Based Irrigation Projects

The model summary sought to determine how Joint Influence of Joint Influence of participatory M&E practices on performance of Community-Based Irrigation Projects. The regression model output statistics results are shown in Table 1.11.

Table 1.11: Regression Analysis of Joint Influence of participatory M&E practices on performance of Community-Based Irrigation Projects

Model Summary

Model	R	R	Adjusted R	Std. Error of the Estimate

		Square	Square	
1	0.716[a]	0.573	0.495	0.4011

a. Predictor, (Constant), Joint Influence of participatory M&E practices

Based on the data presented in Table 1.11, the model summary from a regression analysis indicates that the joint influence of participatory M&E practices has a significant positive impact on the performance of Community-Based Irrigation Projects. The analysis accounts for a substantial portion of the variation in project performance, demonstrating the predictive power of these M&E practices.

The R value of 0.716 shows a strong positive multiple correlation. This confirms a substantial association between the combined participatory M&E practices and the performance of the irrigation projects.

The R^2 value of 0.573 indicates that the joint influence of participatory M&E practices explains 57.3% of the variation in the performance of Community-Based Irrigation Projects. This highlights their significant role in predicting project success.

The Adjusted R^2 of 0.495 suggests that approximately 49.5% of the variance in project performance is genuinely accounted for by these factors, after adjusting for the number of predictors in the model.

The Standard Error of the Estimate of 0.4011 implies that, on average, the model's predictions for project performance scores deviate from the actual observed scores by about 0.4011 units, indicating a high level of precision in the model's predictions.

An ANOVA of the Joint Influence of participatory M&E Practices on Performance of Community-Based Irrigation Projects

The study sought to establish whether the regression model is best fit for predicting performance of Community-Based Irrigation Projects after use of Joint Participatory M&E practices. The regression ANOVA output statistics results are shown in Table 1.12.

Table 1.12: An ANOVA of the Joint Participatory M&E practices on performance of Community-Based Irrigation Projects

Model	Sum	Of Squares	Df	Mean Square	F	Sig.
1	Regression	17.974	4	4.493	27.935	0.000[b]
	Residual	17.050	106	0.161		
	Total	35.024	110			

Dependent Variable: Performance of Community-Based Irrigation Projects
Predictors: (Constant), Joint participatory M&E practices

An ANOVA was performed as part of the regression analysis to determine if the joint influence of participatory M&E practices significantly explains the variance in the performance of Community-Based Irrigation Projects. The results are presented in Table 1.12.

The ANOVA results confirm that the overall regression model is statistically significant, with an F-statistic of F(4, 106) = 27.935 and a significance value of p = 0.000. This finding indicates that the combined effect of the participatory M&E practices significantly predicts the performance of the irrigation projects.

The analysis shows that the variation in project performance explained by the model (Sum of Squares for Regression = 17.974) is slightly larger than the unexplained variation (Sum of Squares for Residual = 17.050). This provides strong evidence that the variables collectively have a real impact on project performance. This allows for the rejection of the null hypothesis and the conclusion that the model is a good fit for the data.

Coefficients for the Regression of Joint Participatory M&E Practices on Performance of Community-Based Irrigation Projects

The study sought to determine whether there was joint effect of participatory M&E practices on performance of Community-Based Irrigation Projects. The regression coefficients results are in Table 1.13.

Table 1.13: Coefficients for the Regression of Joint Participatory M&E practices on performance of Community-Based Irrigation Projects

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
Constant	1.383	0.329		4.208	0.000
Participatory M&E Planning	0.564	0.158	-0.691	-3.58	0.001
Participatory M&E Data Collection	0.266	0.071	0.343	3.735	0.000
Participatory M&E Data Analysis	0.058	0.094	0.048	0.617	0.539

	Participatory M&E Results Utilization.	0.883	0.189	1.002	4.669	0.000

a. Dependent Variable: performance of Community-Based Irrigation Projects

Table 1.13 presents the results of a multiple linear regression analysis detailing the unique influence of four participatory Monitoring and Evaluation (M&E) practices on the Performance of Community-Based Irrigation Projects. The analysis establishes the predictive power and direction of the relationship for each factor while controlling for the others.

The standardized beta coefficients (β) reveal the relative strength and direction of the unique influence of each predictor on project performanceThe results show that three of the four predictor variables are statistically significant ($p<0.05$): M&E Results Utilization, M&E Data Collection, and M&E Planning. M&E Data Analysis is not a unique, significant predictor ($p=0.539$) when the other three factors are included in the model.

Participatory M&E Results Utilization (X4): This is the most influential positive predictor ($\beta=1.002, p=0.000$). Its standardized beta of 1.002 suggests it has an exceptional, dominant unique contribution to performance.

Participatory M&E Planning (X1): This factor shows a statistically significant negative relationship ($\beta=-0.691, p=0.001$). This critical finding suggests that when controlling for the other factors, a higher emphasis on participatory planning (as currently practiced) leads to *worse* project performance.

Participatory M&E Data Collection (X2): This is a statistically significant positive predictor ($\beta=0.343, p=0.000$), confirming that involving the community in collecting M&E data positively influences project performance.

Multiple Linear Regression Equation

The relationship between the participatory M&E practices and project performance is mathematically modeled by the following equation:

$$Y=1.383+0.564(PMEP)+0.266(PDC)+0.058(PDA)+0.883(PUMEF)$$

Where:

Y = Performance of Community-Based Irrigation Projects

PMEP (X1) = Participatory M&E Planning

PDC (X2) = Participatory M&E Data Collection

PDA (X3) = Participatory M&E Data Analysis

PUMEF (X4) = Participatory M&E Results Utilization

Interpretation of Unstandardized Coefficients (B)

The unstandardized coefficients show the predicted change in project performance (Y) for a one-unit increase in the predictor, holding others constant:

M&E Results Utilization (X4): A one-unit increase in utilization is associated with the largest predicted increase in performance, at 0.883 units.

M&E Planning (X1): A one-unit increase in planning is associated with a predicted increase of 0.564 units in performance.

The regression results for Participatory M&E Planning are consistently negative and statistically significant. The Unstandardized Coefficient (B) is −0.564. and the Standardized Coefficient (β) is −0.691 and is statistically significant (p=0.001).

This finding clearly indicates that Participatory M&E Planning has a unique, statistically significant negative relationship with the performance of Community-Based Irrigation Projects when controlling for the influence of data collection, analysis, and utilization.

This suggests that an increase in the current practice of participatory planning (as currently executed) is associated with a predicted decrease in project performance. Possible interpretations for this detrimental effect include:

M&E Data Collection (X2): A one-unit increase is associated with a predicted increase of 0.266 units in project performance.

M&E Data Analysis (X3): The coefficient is 0.058, which is statistically indistinguishable from zero (p=0.539).

CONCLUSION AND RECOMMENDATIONS

This section presents summary of findings, conclusions and recommendations. In the summary of findings, the results for the hypothesis in the study is presented for the research objective. The conclusions presented in this section were guided by the research objectives and informed by the findings,

Summary of Findings

The research objective was to examine the Joint Influence of Participatory Monitoring and Evaluation Practices on Performance of community- based irrigation projects. The composite mean and composite Standard deviation for the combined influence of Participatory Monitoring and Evaluation Practices on Performance of community- based irrigation projects were 3.79, with a standard deviation of 1.07, implying that a comprehensive and participatory approach to monitoring and evaluation is critical for the successful performance of Community-Based

Irrigation Projects

The overall correlation coefficient of determination for the Joint Influence of Participatory Monitoring and Evaluation Practices on Performance of community- based irrigation projects was found to be r=0.716 with a p-value of 0.000<0.05. This indicates that while each practice individually contributes to project success, their joint influence is substantially more impactful.

With a consistently low p-value of 0.000 for the overall correlation, the null hypothesis of no relationship was rejected and it was concluded that there is a significant, strong relationship between the joint influence of participatory M&E practices and the performance of Community-Based Irrigation Projects.

The R^2 value of 0.573 indicates that approximately 57.3% of the variance in the performance of Community-Based Irrigation Projects can be explained by the joint influence of these four variables.

The ANOVA results from the study participants' views indicated that the regression model for the Joint Influence of Participatory Monitoring and Evaluation Practices on Performance of community- based irrigation projects was statistically significant (F(4,110)=27.935 and p−value=0.000<0.05). This confirms that the model is a good fit for the data and that the independent variables, when considered together, are significant predictors of the dependent variable.

The multiple linear regression coefficients result revealed that there was sufficient evidence that Participatory Monitoring and Evaluation Practices jointly and significantly influence the Performance of community- based irrigation projects.

Conclusions

The fifth research objective was to examine the extent to which the Joint Participator*y* Monitoring and Evaluation Practices influence Performance of community-based irrigation projects. The Multiple linear regression coefficients as well as the Pearson correlation results indicated that there was a significant influence of the Joint Participatory Monitoring and Evaluation Practices on Performance of community-based irrigation projects. The p-values implied that there was a significant joint influence of these factors on the performance of community-based irrigation projects

Recommendations

Focus on a Holistic, Combined Approach

Future research and project implementation should recognize that the individual components of participatory M&E are interconnected and their combined effect is what truly drives success. Projects should not focus on one aspect, like data collection, in isolation. Instead, all four practices should be implemented together as a cohesive system. This integrated approach, supported by the study's findings, is the most effective way to ensure the long-term success and sustainability of Community-Based Irrigation Projects in Western Kenya.

Areas for Further Research

Based on the study's findings on the relationship between participatory M&E practices and the performance of Community-Based Irrigation Projects, the following four strategic suggestions for further research are made:

Replication in Diverse Contexts
This study focused on a specific region in Western Kenya. Future research should replicate this study in other parts of Kenya, Africa, or even globally. This would help determine if the relationship between participatory M&E practices and project performance is consistent across different climatic zones, cultural settings, and socio-economic conditions. Such replication is crucial for establishing the generalizability of the findings and for creating a robust, evidence-based framework for participatory development projects.

The Role of Technology in M&E
The increasing availability of mobile technology in rural areas presents a new avenue for research. Future studies could investigate how using digital tools and mobile applications for participatory data collection and analysis affects the efficiency, accuracy, and overall impact of M&E in irrigation projects. For instance, researchers could explore the use of simple apps for farmers to report water levels or crop health, and analyze how this real-time data influences project performance and community decision-making.

Examining Other Influential Variables
This study identified specific participatory M&E practices as key factors. However, other variables may also influence project performance. Future research should empirically examine additional factors, such as:

The influence of social capital: How do existing social networks and trust within a community affect the success of participatory M&E?

Longitudinal Studies
This study provided a snapshot of the relationships at a single point in time. A future longitudinal study could track a group of Community-Based Irrigation Projects over several years. This would provide valuable insights into how the influence of participatory M&E evolves over the project lifecycle, from initial implementation to long-term sustainability. Such research could also analyze how the benefits of participatory M&E accumulate over time and whether it helps projects adapt to challenges like climate change or resource scarcity.

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