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ENHANCING CRITICAL RESOURCES IN MONITORING AND EVALUATION FOR SUSTAINABILITY OF WATER PROJECTS' IN NAIROBI INFORMAL SETTLEMENTS

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***Abstract*:** *Due to the Nairobi city's growing population, many low-income urban inhabitants have been forced into informal and low-income settlements with little to no water or sanitation. Despite many internal water reforms from the City Council of Nairobi in 2006 and the founding of Nairobi City Water and Sewerage Company Ltd, the city's population and its surroundings continue to experience frequent and intermittent water shortages (NCWSC). This paper seeks to; highlight the influence of M&E Budgetary Allocation and point out the influence of M & E Technical Capacity on sustainability to water supply in Informal Settlements Nairobi City County. Budget and staff technical capacity building is critical in achieving projects' objectives and long term sustainability. A descriptive survey research approach was used to collect findings reported in this paper. A population of 730, representing 4 informal settlements were targeted and a sample size of 258 respondents selected using stratified random sampling strategy. The paper concludes based on descriptive, correlation and regression analysis that M&E budget allocation and M&E technical capacity have positive and significant effect on sustainability of water supply in informal settlements in Nairobi City County, Kenya. Hence allocation of sufficient financial resources specifically for M&E activities within water supply projects in informal settlements will lead to sustainability. Finally, the paper recommends investment in building the technical capacity of individuals and organisations involved in M&E activities related to water supply. More investigation can be done to ascertain other factors that contribute to accessibility of water in informal settlements areas since this paper focused on budgetary and staff technical capacity only.*

Keywords: *Critical Resources, Monitoring, Project Sustainability, informal settlements, water projects*

1. Introduction and Background

Alongside the increase in urban populations, informal settlements, slums, and impoverished residential areas are expanding worldwide. According to UN-Habitat (2015), for more than ten years, an estimated 25% of people in metropolitan areas throughout the world have lived in informal settlements, adding to 213 million people to the planet's population. Residential areas, known as "informal settlements," are those where residents frequently lack housing security, and local communities frequently lack basic amenities and civic infrastructure. Consequently, the house may not adhere to planning and building laws and is frequently built in ecologically and physically sensitive locations (UN-Habitat, 2015b; Bardi et al., 2016). Provision of water for household use follows infrastructural development. The World Bank has had a long-standing involvement in assisting with the expansion of water access and sanitation services in Kenya via numerous International

Development Association (IDA) investments in the Nairobi City Water and Sewerage Company (NCWSC), Athi Water Services Board (AWSB), and Kenya Informal Settlements Improvement Project (KISIP).

According to Kusek and Rist (2004), monitoring and evaluation are concerned with measuring and evaluating the results that impact a program after implementation. M&E uses well planned and appropriate methods which is necessary for effective monitoring and evaluation to demonstrate program outcomes and impacts. In order to assess achievements and make better-informed decisions, Nuguti (2009) contends that monitoring and evaluation are crucial project management tools. When implemented properly, these instruments guarantee that initiatives and programs are useful and successful, resulting in sustainable community development. Further to this, monitoring and evaluation, provide government representatives, development managers, and civil society with better ways to learn from the past, improve services, plan and allocate resources, and show outcomes as part of the responsibility to key stakeholders. Management increasingly uses M&E technologies to find new information and incorporate it into the project plan; management increasingly uses M&E technologies.

2. Problem and Focus

Access to a clean, reliable water supply remains a significant concern in many emerging cities, including Nairobi City County, Kenya, due to the fast urbanization and expanding informal settlements. Overcrowding, inadequate facilities, and a shortage of resources in informal settlements typically increase water supply issues, which harm human health and social and economic status. M&E systems in projects dealing with water among other utilities is crucial to address challenges and improve the projects' outcomes.

The impact of M&E budget allocation, and the connection between M&E staff technical capability and the sustainability of water supply projects efforts provide crucial knowledge for making informed decisions regarding water issues. Given the urgent need to tackle water supply issues within the context of urbanization and the critical need for better living conditions in informal settlements, this paper provides an avenue for continuing the conversation.

The paper hence focuses on the following objectives which guided the investigations and findings discussions:

1. To assess the influence of M&E budget allocation on the sustainability of water supply projects in informal settlements Nairobi City County, Kenya.
2. To examine the Influence of M&E staff technical capacity and the sustainability of water supply projects in informal settlements in Nairobi City County, Kenya.

3. Theoretical Review

A theoretical framework is a collection of interrelated ideas based on theories, reasoned set of propositions derived from and supported by a general set of assumptions about the phenomena of the investigation. Theories provide indicators and examples of what is incorporated into the framework hence guiding the investigative work and interpretation of the findings.

From this understanding, paper is anchored on Resource Based and Program of Change theories. According to the RBV, resource allocation favors missions over workflows. The project management of resources for any entity's function and the allocation of resources for water accessibility in settlement areas are critical decisions

to those in management. Because resources are deemed limited, the logic of the decision-making process affects which function will receive funding in any particular organization. A conscious decision must be made by those in authority to allocate resources proportionately so as to create a balance in the projects' activities. Because of the lack of understanding on the critical role played by M&E in projects', resources for this function are minimal. To make matters even worse, budgets for M&E are frequently impacted by resource reallocation, regardless of campaigning and stringent restrictions project funders impose.

The idea of resource allocation is important in M&E since it calls for funding for staff salaries, capacity building for project employees, and the distribution of monies for the execution of routine M&E operations that are routinely scheduled work. The RBV theory was used to assess budgetary allocation's influence on water supply projects' sustainability in informal settlements in Nairobi City County, Kenya.

The program of change theory was created by Huey Chen, Peter Rossi, Michael Quinn Patton, and Carol Weiss (Atlas of Public Management, 2023). This theory focuses on the procedures used to effect change and the people in charge of seeing that change through. The program theory aids in developing budgetary plans and analyzes the best way to identify potential recipients of the required intervention. The program theory provides logical way of organizing M&E information to achieve a desirable outcome. However, care must be taken when using the program theory because not all M&E data can be programmed. Change is also dynamic and M&E activities require constant changes in order to attain optimum benefits.

Furthermore, program theory provides details on how the planned activities are a good representation of the anticipated social benefits for various target populations. Utilizing the theory-based program framework in M&E improves the ability to determine the outcomes of particular projects, including anticipated and unwanted outcomes (Gooding et al., 2018).

Budgetary support for monitoring and evaluation (M&E) is essential for maintaining the water supply in Nairobi County, Kenya's informal settlements. This funding is crucial for tackling important issues, including water security, proper water supply, and utility management, which influence people's well-being and the overall growth of these underserved regions.

4. Literature Review and Conceptual Framework

According to Gichohi et al., (2019), water stress and shortage brought on by climate change and other human factors, the sustainability of the water supply has grown to be a major worry for worldwide society. It is especially important for metropolitan regions where rising rural-to-urban migration has led to population growth and increased demand for infrastructure and basic services. Universal access to basic sanitation in schools is one of the Sustainable Development Goals, although it presents significant hurdles. Schools need a secure, sanitary, and gender-separated environment for many children.

Water security in slums is directly impacted by M&E budget allocation. With enough financing, stakeholders can implement effective monitoring systems to track water sources, quality, and availability. By enabling prompt reactions to possible hazards like pollution, unauthorized water use, or infrastructure damage, this real-time data helps to guarantee that locals have access to secure and clean water supplies (Njogu, 2016). Additionally, financial allocation for M&E aids the efficient operation of the water company. Modern technology and creative approaches to water delivery, invoicing, and leak detection may be implemented with the right budgetary allocation. Water utilities may save costs, increase billing accuracy, and streamline operations using technology and innovation, ensuring that resources are used effectively and efficiently.

Another crucial area that is influenced by M&E budget allocation is capacity building. Enough financing makes training and skill-development programmes for water utility employees, local authorities, and citizens possible (Thuku, 2021). Individuals are given the tools to participate actively in the administration and upkeep of water delivery systems, guaranteeing long-term sustainability. Budgetary allocation for stakeholder regular engagements, for technological innovations and for key personnel capacity building is necessary to achieve project sustainability.

In Nairobi County, Kenya's informal settlements, monitoring and evaluation (M&E) staff technical capacity—which includes competency, training and skill development, and quality assurance—plays a crucial part in maintaining the sustainability of the water supply (Mwaura & Odera, 2021). These factors substantially influence the management of water utilities, appropriate water supply, and water security, which enhances the general well-being of inhabitants in these underserved places.

Technical proficiency in M&E guarantees that those managing water supply systems have the essential knowledge and skills. Effective water infrastructure design, implementation, and maintenance require competent personnel. They may choose technology wisely and design infrastructure and maintenance plans with knowledge, all of which support the sustainability of the water supply.

Building and developing the capacities of staff members involved in managing the water supply depends on training and skill development. People that invest in training programmes have the most recent information and practical skills needed for operating, maintaining, and responding to emergencies with water systems (Nzoka, 2017). Teams with proper training are better equipped to handle technical difficulties quickly and effectively, enhancing utility management and water security.

From the literature and theoretical review, it's evident that budget allocation and staff technical capacity development play crucial role in enhancing M&E in organisations. A firm that invest in resource mobilization and capacity development stands to gain competitive advantage. Access to water in Nairobi information.

The relationship between variables in this paper are elaborated below in a conceptual framework:

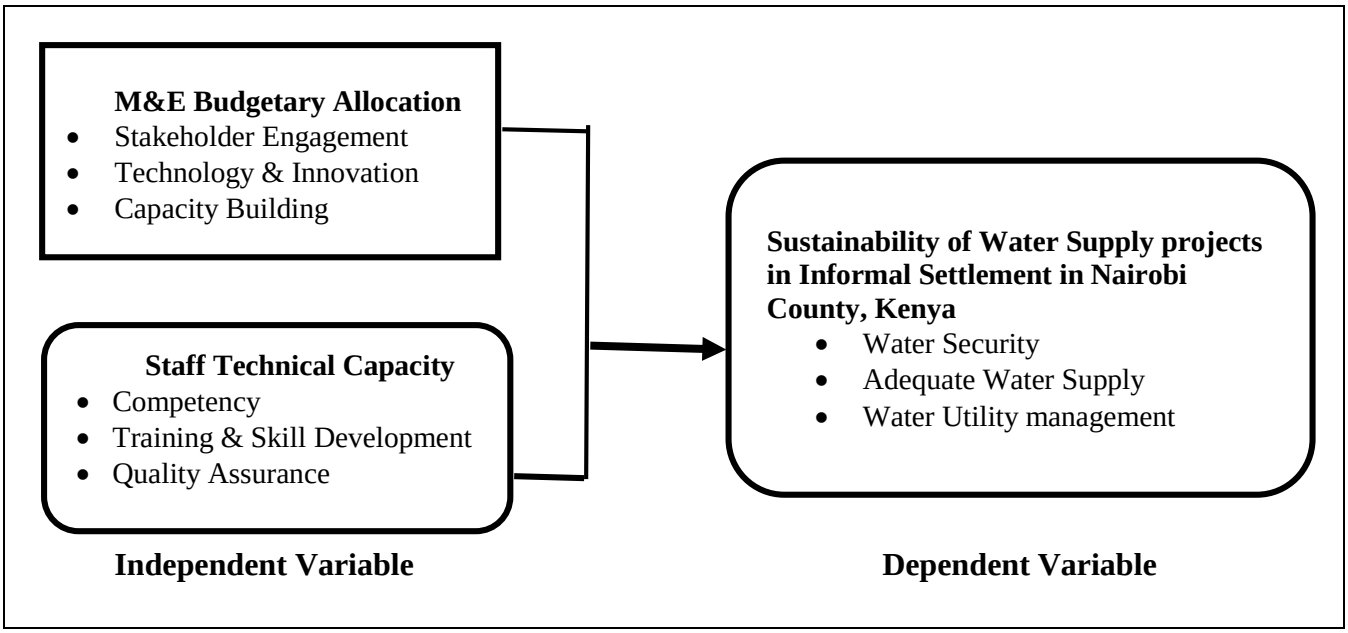

Fig 1: Conceptual Framework

From figure 1, we identify constructs that influence the relationship between the dependent and independent variables. Specifically, budgetary allocation and staff capacity are anticipated to influence the sustainability of water projects in form of water security, water adequacy and water utility management.

5. Methodology and Research Design

A descriptive survey research approach was used for this investigation. Using descriptive survey research designs enable researchers to gather data, summarize, present, and analyse it for clarity in early and exploratory studies (Abbott, & McKinney, 2013). The researcher will be able to ascertain and document the state of things thanks to the design. This design's main goal is to determine how closely related the elements under investigation are to one another while also allowing the researcher to concentrate on examining and deriving conclusions from the distinctions already present between the phenomena under investigation. The elements investigated provides insight into how various construct play out to determine the outcomes of M&E in distribution of water services to the population of interest.

A population comprising residents of Kayole Soweto, Mathare, and Kibra individuals who engage and interact with different service models within the informal settlements. These service models include Pre-Paid Dispensers and metered connections as part of the monitoring and evaluation practice on sustainability of water supply projects in informal settlements in Nairobi city county, Kenya. The study focused on the informal settlements below, comprising all the service models described above, and the residents understand the water-related challenges. Their distribution is shown in Table 1 below.

Table 1: Target Population

Informal settlement area	Target POPULATION Size	Percentage
Kayole Soweto	200	27.4
Mathare	230	31.5
Kibra	300	41.1
Total	**730**	**100.0**

A sample of 258 repsondents was obtained from the population using the Slovin formula. Slovin's Formula, is used to calculate the sample size (n) given the population size (N) and a margin of error (e). It is computed as n = N / (1+Ne2). In this case the sample was calculated as follows:

$$n = \frac{N}{1 + NE^2}$$

Where by: n = samples

N = total population (730)

E = error margin / margin of error (0.05)

$$n = \frac{730}{1+730*0.05^2} = \frac{730}{2.825} = 258.407$$

n≈258

From formula, a sample size of 258 respondents was obtained and proportionately distributed as shown in Table 2 below.

Table 2: Sample Size

Category	Target Size	Sample Size
Kayole Soweto	200	71
Mathare	230	81
Kibra	300	106
Total	**730**	**258**

Data for this paper was collected using closed ended questionnaire which was distributed to the sample strata to ensure representation of the different clusters of the population. Research assistants who are the familiar with the informal settlements in Nairobi, Kenya. These assistants had participated in other researches in the past. Instrument reliability was tested using the pilot results and an average Cronbach's alpha reliability coefficient of 0.830 was obtained for the questionnaire items. The validity tested using experts' opinion which yielded an average of 78% levels. The instruments used were therefore considered valid and reliable and by extension the findings are dependable in decision making and in informing water distribution value chain players in Nairobi City county informal settlement areas.

Data used in this paper was analyzed using descriptive and inferential statistics with the help of SPSS software version 27.0. Multiple regression analysis and correlation models were used to estimate the influence of various constructs on the dependent variable.

6. Description Statistics Findings

The respondents were requested to indicate their extent of agreement on statements relating to M&E budget allocation and the sustainability of water supply in informal settlements in Nairobi City County, Kenya. A 5-point Likert scale was used to ascertain the level of agreement or disagreement with the various constructs posed.

From the findings, respondents agreed to a large extent that allocating a budget for Monitoring and Evaluation (M&E) activities is crucial for tracking project progress. It is supported by a mean of 3.943 (std. dv = 0.981). In addition, as shown by a mean of 3.926 (std. dv = 0.850), the respondents agreed that adequate funding for M&E activities ensures accountability and transparency in water supply projects. Further, the respondents agreed that M&E budget allocation is often overlooked, leading to project oversight and improvement challenges. Overall an aggregate mean score of 3.898 and a standard deviation of 0. 873 implying that all the respondents were in agreement. Table 3 below shows these findings.

Table 3: M&E Budget Allocation and the Sustainability of Water Supply Projects

	Mean	**Std. Deviation**
Allocating a budget for Monitoring and Evaluation (M&E) activities is crucial for tracking project progress.	3.943	0.981
Adequate funding for M&E activities ensures accountability and transparency in water supply projects.	3.926	0.850

M&E budget allocation is often overlooked, leading to challenges in project oversight and improvement.	3.911	0.914
Lack of awareness about the importance of M&E can result in insufficient budget allocation.	3.896	0.947
The sustainability of water supply projects depends on proper maintenance and repair.	3.889	0.856
Community involvement and ownership play a key role in ensuring the sustainability of water supply projects.	3.876	0.694
Aggregate	**3.898**	**0.873**

As shown in the table above, budgetary allocation ensures effective M&E outcomes and hence there is need to pay more attention to budget for projects M&E activities. The findings show that in this case respondents expressed concern on how budgets for M&E are often overlooked hence affecting the quality of these outcomes.

Another aspect of critical resources that was of interest to this paper is the technical skills for the staff working in the water projects. Human resources represent a crucial aspect of any project or work activity. It forms the backbone of any successful venture.

From the results, the respondents agreed that building technical capacity for M&E activities is vital for accurately assessing the performance of water supply projects. It is supported by a mean of 3.968 (std. dv = 0.905). In addition, as shown by a mean of 3.859 (std. dv = 0.885), the respondents agreed that adequate training and resources are required to develop the technical skills necessary for effective data collection and analysis M&E. Further, the respondents agreed that skilled M&E professionals play a crucial role in designing and implementing monitoring systems that provide actionable insights.

Table 4: M&E Staff Technical Capacity and the Sustainability of Water Supply Projects

	Mean	**Std. Deviation**
Building technical capacity for M&E activities is vital for accurately assessing the quality assurance performance of water supply projects.	3.968	0.905
Adequate training and resources are required to develop the technical skills necessary for effective data collection and analysis in M&E.	3.859	0.885
Skilled M&E professionals play a crucial role in designing and implementing monitoring systems that provide actionable insights.	3.800	0.605
Collaborative efforts to enhance M&E technical capacity led to more robust and reliable data for decision-making.	3.705	0.981
Continuous learning and knowledge-sharing among M&E practitioners are essential to stay updated on best practices and innovations.	3.698	0.872
Aggregate	**3.819**	**0.867**

Based on the descriptive findings we can assert that enhancing the technical capacity of staff stands to benefit the project M&E activities greatly since they will be well equipped to deal with emerging issues as well as have the requisite knowledge and skills necessary for carrying out their duties.

Inferential Statistics Findings

In order to ascertain the level of influence that various constructs have on the dependent variable, a higher level analysis was done. This section describes these findings.

7. Correlation Analysis

Pearson correlation analysis to was used to determine the strength of association between independent variables (M&E budget allocation, and M&E technical capacity) and the dependent variable (sustainability of water supply projects in informal settlements in Nairobi City County, Kenya) dependent variable. Pearson correlation coefficient ranges between zero and one, where the strength of association increases as the correlation coefficients' value approaches one (0-1).

The results showed a very strong relationship between M&E budget allocation and the sustainability of water supply projects in informal settlements in Nairobi City County, Kenya (r = 0.836, p-value =0.002). The relationship was significant since the p-value of 0.002 was less than 0.05 (significant level). The findings align with the findings of Brown and Hyer (2016), who indicated a very strong relationship between M&E budget allocation and organizational performance.

Table 5: Correlation Coefficients

		Sustainability Water Supply	**M&E budget allocation**	**M&E Staff technical capacity**
Sustainability of Water Supply Projects	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	251		
M&E budget allocation	Pearson Correlation	.836**	1	
	Sig. (2-tailed)	.002		
	N	251		
M&E Staff Technical Capacity	Pearson Correlation	.856**	1	
	Sig. (2-tailed)	.000		
	N	251		251

The results showed a very strong relationship between M&E budget allocation and the sustainability of water supply projects in informal settlements in Nairobi City County, Kenya (r = 0.836, p-value =0.002). The relationship was significant since the p-value of 0.002 was less than 0.05 (significant level).

8. Regression Analysis Results.

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.940	.884	.885	.582

Predictors: (Constant), M&E budget allocation and M&E technical capacity

The model summary was used to explain the variation in the dependent variable that the independent variables could explain. The r-squared for the relationship between the independent and dependent variables was 0.884, indicating that 88.4% of the variation in the dependent variable (sustainability of water supply projects in informal settlements in Nairobi City County, Kenya) could be explained by independent variables (M&E budget allocation and M&E technical capacity).

Table 7: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.027	4	3.018	111.7	.000[b]
	Residual	6.568	246	.027		
	Total	18.595	250			

*Dependent Variable: sustainability of water supply
*Predictors: (Constant), M&E budget allocation and M&E technical capacity

The ANOVA was used to determine whether the model fit the data well. F calculated was 111.7, while the F critical was 2.408. The p-value was 0.000. Since the F-calculated was greater than the F-critical and the p-value 0.000 was less than 0.05, the model was considered a good fit for the data. Therefore, the model can be used to predict the influence of M&E budget allocation, and M&E technical capacity on the sustainability of water supply projects in informal settlements in Nairobi City County, Kenya. Thus if Nairobi county took time to improve budgetary allocation and instilled critical technical skills during M&E activities, the water projects in the informal settlements will be greatly improved.

Table 8: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	M&E budget allocation	0.387	0.091	0.388	3.59	0.003
	M&E technical capacity	0.392	0.102	0.393	3.84	0.001

a Dependent Variable: sustainability of water supply

The regression model is as follows:

$$\mathbf{Y = 0.387X_1 + 0.392X_2 + \varepsilon}$$

Based on these results, M&E budget allocation significantly affects water supply projects' sustainability in informal settlements in Nairobi City County, Kenya β1=0.387, p value= 0.003). The relationship was considered significant since the p-value of 0.003 was less than the significant level of 0.05.

M&E technical capacity also significantly affects water supply sustainability in informal settlements in Nairobi City County, Kenya β1=0.392, p value= 0.001). The findings are in line with Zimmermann et al. (2015), who found a very strong relationship between M&E technical capacity and organizational performance.

9. Summary of Findings, Conclusions and Recommendations

In summary this paper found that M&E budget allocation has a positive and significant effect on the sustainability of water supply projects in informal settlements in Nairobi City County, Kenya. From the results, the respondents agreed that allocating a budget for Monitoring and Evaluation (M&E) activities is crucial for tracking project progress. This is supported by a mean of 3.943 (std. dv = 0.981). In addition, as shown by a mean of 3.926 (std. dv = 0.850), the respondents agreed that adequate funding for M&E activities ensures accountability and transparency in water supply projects.

In addition, M&E staff technical capacity was found to have a positive and significant effect on the sustainability of water supply in informal settlements in Nairobi City County, Kenya. From the results, the respondents agreed that building technical capacity for M&E activities is vital for accurately assessing the performance of water supply projects.

The paper also concludes that since M&E technical capacity has a positive and significant effect on the sustainability of water supply projects in informal settlements in Nairobi City County, Kenya. This implies that investing in staff skills and knowledge is critical in attaining sustainability.

The paper recommends that in order to improve water projects' sustainability there is need to consider allocating adequate funds and also continually build technical capacity for the project staff.

Future researches can focus on other resources that are necessary for sustainability of projects since the current study focused on budgets and staff technical capacity.

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