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Influence of Project Monitoring & Evaluation on Completion Time of Mwache Dam and Mukurumudzi Dam in Kwale County

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Abstract

Dam projects require extremely high technical requirements, human management capabilities and large budgets before starting their construction. Thus, time delivery to undertake project dam from problem identification, design, planning and actual construction is very important. Dam projects in Kenya are often not completed in the time scheduled at. This paper determined the influence of monitoring & evaluation on completion time of Mwache Dam and Mukurumudzi Dam in Kwale County. Descriptive research design was utilized in this study. The target population of the study was 212 comprising of 13 project managers, 45 project super indents, 22 site engineers, 17 financial consultants and 26 community representatives from Mwache Dam and 7 project managers, 39 project super indents, 16 site engineers, 9 financial consultants and 18 community representatives from Mukurumudzi Dam. Data was collected by administering structured questionnaires to dam project personnel. Quantitative data were analyzed with the help of the SPSS software Version 25.0 and both descriptive and inferential statistics were generated. Regression of coefficients showed that is a positive and significant relationship between project monitoring & evaluation and dam project completion for both Mwache Dam (β_1=.892, p=0.000) and Mukurumudzi Dam (β_2=.850, p=0.000). The study concludes that project monitoring & evaluation influences dam project completion time. The study recommends for the adherence of proper project monitoring and evaluation techniques to ensure timely completion of dam projects. Monitoring and evaluation of the dam need to periodic as it will help identify defects in the construction at the earliest time possible and corrective action taken.

Keywords: *Monitoring & evaluation, completion time, Mwache dam, Mukurumudzi Dam, Kwale County*

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1.1 Introduction

The success of a project is measured based on project completion and attainment of project goals. The success of a project is achieved only if it is accomplished within the budget, time scope and meets the quality standards, user desires and technical requirements (Amoatey, Ameyaw, Adaku & Famiyeh, 2015). Further, Satankar and Jain (2015) acknowledge that successful completion of project entails project completion within budget, time schedule and quality. Cost, time and quality are some of critical attributes associated with successful completion of a project. Bredin and Söderlund (2013) also identify project completion within schedule, budget, nature of workmanship, client specification, technical requirements, environmental and safety requirements as measures of successful project completion.

Dam construction involves acquiring land to build, conducting feasibility study, developing the building program and design, obtaining the necessary public approvals and financing, marketing the project for prospective funding, building the structure and undertaking periodic dam maintenance (Golizadeh, Banihashemi, Sadeghifam & Preece, 2017). The need to accurately estimate duration of dam construction so as to ensure successful completion must consider critical aspects of budget, time and quality (Gar, 2017). Project management entails project monitoring and evaluation, project scope management, project time management, project cost management, project quality management, project human resource management, project communication management and project stakeholder management (Kerzner, 2019).

Project monitoring is the periodic checking of projects according to agreed time goals. Monitoring and evaluation (M&E) assists project managers to better the performance of their firms (Hughes, 2015) while Evaluation is the periodically assessing the relevance and efficiency of project as per the goals outlined (Naidoo, 2011). Monitoring and evaluation as a project assessment tool allows project management to ascertain whether project deliverables are being undertaken as stipulated. Project evaluation provides timely assessments of the relevance, efficiency, effectiveness, impact and sustainability of interventions and overall progress against original objectives. Effective monitoring and evaluation are important ingredients of successful project completion (Tengan & Aigbavboa, 2017).

The Kenyan Government has been undertaking the construction of several dams which however, majority have been hampered by delays, costs overrun and poor quality. Most of the dams are single-purpose dams, but there are now a growing number of multipurpose dams (Olima & K'akumu, 2019). Many projects complete or ongoing have targeted irrigation (48%), hydropower (17%), water supply (13%), flood control (10%), recreation (5%) and less than 1% for navigation and fish farming (Olima & K'akumu, 2019). However, many dams in Kenya have run overtime to be completed or some become stalled. Table 1 shows some of major dam projects in Kenya under construction.

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Table 1: Major Dam under construction in Kenya

Dam	Proposed Start date	Actual Start date	Percentage completed	Expected completion	Time remaining to completion
Mwache Dam	March 2018	February 2019	7%	Dec 2021	1.6 years
Thwake Dam	April 2017	March 2018	32%	June 2022	2 years
Thiba Dam	October 2017	March 2018	44%	September 2021	1.4 years
Itare Dam	April 2017	September 2017	30%	April 2021	1 year
Thirika Dam	March 2018	August 2019	16%	June 2022	2 years
Mukurumudzi Dam	January 2012	January 2012	100%	August 20113	1.7years

Source: Ministry of Water and Irrigation report 2020

It is evident in Table 1 that most dam projects in Kenya are behind schedule. In the context of the study, we shall focus on Mwache Dam and Mukurumudzi Dam in Kwale County. The project, funded by the World Bank, is being built across the Mwache River in Kinango Sub-County. The construction of Mwache multipurpose project is meant to harness the flood flows from Mwache River basin for domestic water supply and irrigation in Kwale and Mombasa counties respectively. Mwache Dam was to be kicked off in early 2018; however it was dragged to February 2019. The dam is currently 7% complete far behind time schedule of being completed in December 2021. The construction of the multi-billion Mwache Dam project has dragged following delays to compensate more than 4,000 people who according to the Ministry of water and irrigation.

Design and construction management for the Mukurumudzi Dam was undertaken by Wave International Pty Ltd in association with ARQ. Construction of the dam started in January 2012 with completion in August 2013, and was undertaken by a local Kenya Civil Contractor, Hayer Bishan Singh & Sons Ltd. It is currently operational by Australian mining company. Ongoing dam project (Mwache dam) and completed dam project (Mukurumudzi Dam) have been included in the study for comparison purposes. Comparison can be in terms of project management practices across the two selected dams.

1.2 Statement of the Problem

Dam projects are complex projects that require sufficient funding, technical specification and ample time to construct. Therefore, for this type of project, establishing a realistic duration for construction prior to the bidding stage is important for both contractors and clients in meeting their objectives (Gar, 2017). The success of the dam project still remains generally low/poor/ in Kenya. There are many cases of stalled, stagnated and collapsed dam projects in Kenya (Olima & K'akumu, 2019). Many dam projects are way behind schedule behind schedule. Construction of the Sh14 billion Mwache Dam in Kwale County is several months behind schedule implying that projected completion time will be seriously hampered (Ministry of Water and Irrigation report, 2020). Mwache Dam was to be kicked off in early

2018; however it was dragged to February 2019. The dam is currently 7% complete far behind time schedule of being completed in December 2021.

The design and construction of Mukurumudzi Dam started in January 2012 with completion in August 2013. The construction was undertaken by Wave International Pty Ltd in association with ARQ. Construction of Mukurumudzi Dam took the shortest time (1.7 years) and was not characterized by time delays and scope creep that characterize most dams discussed in this study. Ongoing dam project (Mwache dam) and completed dam project (Mukurumudzi Dam) have been included in the study for comparison purposes. Comparison was in terms of project management practices across the two selected dams.

The project delivery success adopted in the developed countries is anchored on policies that seek to involve the stakeholders and procurement to improve on the quality, cost and scope of project completion (Gbahabo & Ajuwon, 2017). In Myanmar, Gar (2017) looked at the critical success factors of project management for dam projects and found that the delay and cost overruns of construction projects are dependent entirely on the very early stages of the project. Nair (2016) investigated on project management, leadership and skills for the case of the Three Gorges Dam in China and noted that inadequate project monitoring and evaluation impacted completion time of dam projects.

Olima and K'akumu (2019) looked at problems on project implementation of Thika Dam in Kenya and indicated that delays in acquiring land, seriously impacts dam project performance resulting high cost overruns and time escalations. This is the basis of the study and thus it investigates the influence of monitoring & evaluation on completion time of Mwache dam and Mukurumudzi Dam in Kwale County.

1.3 Research Objectives

To examine the influence of project monitoring & evaluation on completion time of Mwache dam and Mukurumudzi Dam in Kwale County.

2.0 Literature Review

2.1 Review of Theories

The paper is guided by program theory and program evaluation theory.

2.1.1 Program Theory

Pragarm theory was postulated by Bickman in 1987. A program theory consists of a set of statements that describe a particular program, explain why, how, and under what conditions the program effects occur, predict the outcomes of the program, and specify the requirements necessary to bring about the desired program effects (Sharpe, 2011). Project theory attempts to collect, analyze and use the results to explain project progress, efficiency and effectiveness (Rogers & Funnell, 2013). Program theory is an important tool in the visualization of a project and how to undertake good project M&E (Funnell & Rogers, 2011). Program theory highlights why and how to undertake project monitoring and evaluation for successful completion of the project **(**Brousselle & Champagne, 2011).

However, the program theory has received some criticism from other scholars. Program requires extensive collection and analyses of data which may be time consuming and costly. The theory changes over time and past postulations may not hold in future (Sharpe, 2011). Thus, the development and evaluation processes of project are time consuming requiring a lot of time.

Program theory facilitates the use of monitoring and evaluation tool in assessing project progress. Effective project monitoring and evaluation is important in identifying huddles during project development and assess project progress against time and budget. Program theory thus allows the evaluation of project and ensures that it is delivered within time scope and budget.

2.1.2 Program Evaluation theory

Program evaluation theory was advanced by Weiss in 1998. The theory advocates for the systematic assessment of the operations and outcomes of a program. According Rossi *et al.* (2004) program theory attempts to plan, configure and channel resources in a particular way with view of achieving certain goal. McClelland and McBer (1980s) postulated the competence theory attempting to uncover the competencies requirement in the management of projects. The theory is further defined by as process through which program components are presumed to affect outcomes and the conditions under which these processes are believed to operate. Program theory guides an evaluation by identifying key program elements and articulating how these elements are expected to relate to each other (Chen, 2014). Program theory helps managers plan on time and resources (Mertens & Wilson, 2018) and how program is progressing (Weiss, 2004).

Since evaluation is important in aiding decision making of projects, the nature of data used is important. This implies an understanding of the decision-making environment to which the evaluation findings will be introduced (Mertens & Wilson, 2018). The methodology proposed by the program evaluation theory has been questioned for lack of clarity. Moreover, creating a technique in evaluating program involves more of art that scientific prove (McDavid, Huse & Hawthorn, 2013).

The technical strengths and weaknesses this theory must be handled with care for it to remain relevant. The major strength of the program evaluation theory lies in its ability to project incremental effects of the project in complex and unclear environments (Guyadeen & Seasons, 2018). However, the weakness that is, theory calls for sophisticated comprehension of the dynamics of the program and skill in create quantitative models (Brousselle & Champagne, 2011).

Management of mega projects including dam projects; it requires the project managers to acquire the project management and financial skills such as project monitoring and evaluation skills of such projects. Monitoring and evaluation allows project manager to assess project progress against time and budget. The above theory instigated the research objective: to determine the influence of monitoring & evaluation on completion time of Mwache dam and Mukurumudzi in Kwale County.

2.2 Empirical Review

Monitoring is a systematic technique of overseeing project in progress (Ogolla & Moronge, 2016). Evaluation is the assessment of project progress against certain project deliverables (Shihemi, 2016). From the point of view of Aneesha and Haridharan (2017), evaluations should help to draw conclusions about five main aspects of the intervention: relevance, efficiency, effectiveness, impact and performance of projects. Monitoring and evaluation, is particularly important to sustainability since it allows an ongoing review of project effectiveness (Ghaben, 2015). Monitoring and evaluating is essential in ensuring that dam projects are being undertaken against set budget, time, scope and technical specification to ensure that the project are completed in time and in quality standard and user satisfaction (Naidoo, 2011).

Effective Monitoring and Evaluation is an ingredient of successful completion of project and its performance and sustainability (Tengan & Aigbavboa, 2017). Monitoring and evaluation allows the establishment of accountability and transparency in the management of project (Naidoo, 2011). It also facilitates continuous project learning for future improvement (Hughes, 2015).

Ogolla and Moronge (2016) conducted a study on the determinants of effective monitoring and evaluation of government funded water projects in Kenya the case of Nairobi County. The study adopted descriptive design survey approach. From the descriptive analysis, the study results revealed that monitoring and evaluation influence the sustainability of water projects.

Maunda and Moronge (2016) looked at project life cycle management and completion of public projects in Makueni Sub County, Kenya by adopting descriptive research design. Project monitoring and evaluation, execution and closure phases in project life cycle management are positively correlated.

Shihemi (2016) studied use of monitoring and evaluation in enhancing project performance of construction projects in Kenyan. A descriptive method of survey was used. Correlation and multiple regression analysis were also done to show the relationship between the study variables. The study concludes that project monitoring and evaluation enhances the project performance of building and construction in university of Nairobi to a large extent. However, the study lacked aspects of project monitoring, evaluation and project performance hence the need to conduct the study.

Golizadeh, Banihashemi, Sadeghifam and Preece (2017) studied automated estimation of completion time for dam projects. An accurate estimation of construction duration for the successful completion of infrastructure projects is as important a task as keeping a project within the stipulated budget and quality. Artificial neural network which is an automated application significantly helped in monitoring and evaluated project progress.

Ndungu (2014) studied factors influencing the completion time of water projects in Water Service Boards in Kenya of Athi Water Services Board. Descriptive survey design was utilized in this study. It was established that contractor competence, monitoring and evaluation abilities, financial support, adequacy of equipment positively affects time of project completion.

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2.3 Conceptual Framework

Figure 1 shows a conceptual framework presenting the relationship between monitoring & evaluation and completion of projects.

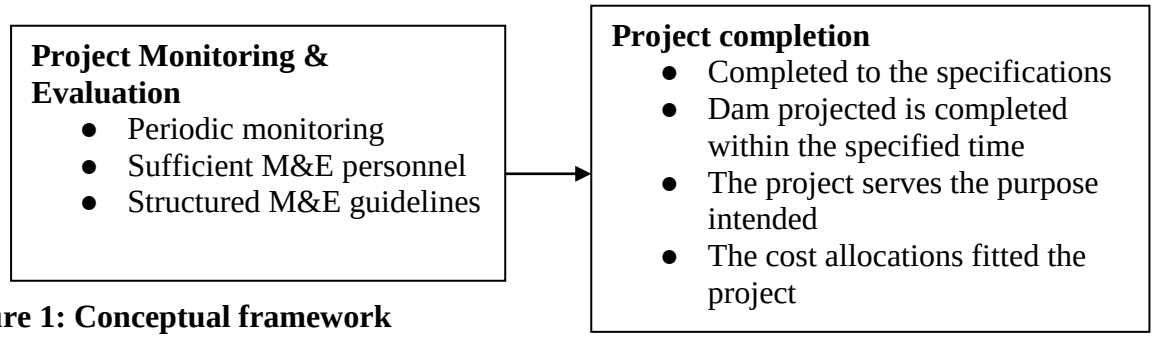

Figure 1: Conceptual framework

The conceptual model presented in figure 1 depicts the relationship between the independent variables of the study namely monitoring & evaluation and project completion as the dependent variable. Monitoring and evaluation ensures that project inputs, process and outputs are periodically monitored and evaluated so that project deliverables are achieved in the intended time schedule.

3.0 Research Design and Methodology

The study employed descriptive survey design. The target population of the study was 144 respondents comprising of 13 project managers, 45 project super indents, 22 site engineers, 17 financial consultants and 26 community representatives (Mwache Dam Construction report, 2020). Mwache dam is a continuing dam under construction. The study also targeted 89 respondents from Mukurumudzi Dam comprising 7 project managers, 39 project super indents, 16 site engineers, 9 financial consultants and 18 community representatives. Mukurumudzi Dam was started in 2012 and completed in 2013. It is currently operational by Australian mining company. Ongoing dam project (Mwache dam) and completed dam project (Mukurumudzi Dam) have been included in the study for comparison purposes.

Yamane formula was used to calculate sample size of 139 participants comprising 9 project managers, 29 project super indents, 14 site engineers, 11 financial consultants and 17 community representatives from Mwache Dam; 5 project managers, 26 project super indents, 10 site engineers, 6 financial consultants and 12 community representatives from Mukurumudzi Dam. Data collection was conducted by the use of structured questionnaires.

Statistical Package for the Social Sciences (SPSS) software version 25.0 was used to organize code and analyze information and generate quantitative report. Data was split to arrange data according to respondents, grouping response from Mwache Dam together and Mukurumudzi Dam together. Data splitting allowed comparison analysis of the influence of project management on completion time of Mwache dam and Mukurumudzi dam. Data analysis involved descriptive statistics, correlation and regression statistics. Factor analysis was also used to pick the relevant statements to be included in the analysis. Factor analysis was conducted using Principal Components Method (PCM) approach. For Principal Components Method, extraction values of more than 0.45 were retained for further analyses (Field, 2013).

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Correlation was used to establish the association between monitoring & evaluation and completion time for both Mwache dam and Mukurumudzi Dam in Kwale County. Regression analysis helped determine relationship project management on completion time for both Mwache dam and Mukurumudzi Dam. 95% confidence interval was used to check the significance of statistics generated. The particular multiple regression model is shown as;

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \epsilon}$$

Where;

Y = Project completion

X_1 = Monitoring & evaluation

In the model, β_0 = the constant term while the coefficient $\beta_i = 1$ measured the change in the dependent variable (Y) to unit change in the predictor variables X_1. The error (ϵ) term captures other elements not included in the equation.

4.0 Presentation, Discussion and Interpretation of Findings

In this study, 139 were distributed whereas 121 questionnaires were well filled and returned. The response rate for respondents from Mwache Dam and Mukurumudzi were sufficiently good for further analysis. Out of the 89 questionnaires administered to respondents in Mwache Dam, 63 were properly filled and returned representing 78.8 percent response rate. Likewise, of the 59 questionnaires administered to respondents of Mukurumudzi Dam, 58 were properly filled and returned representing 98.3 percent response rate. The analysis of the study involved correlation and regression analysis. Interpretation and discussion of results are also presented.

4.1 Descriptive on Project Monitoring & Evaluation

The first objective of the study was to examine the influence of monitoring & evaluation on completion time of Mwache dam and Mukurumudzi Dam in Kwale County. The results are shown in Table 2.

Descriptive results in Table 2 showed that majority of respondent disagreed that there is sufficient M&E personnel, with mean response of 2.2 and standard deviation of 1.3 implying that all the dams were deficient of adequate monitoring and evaluation personnel. Output shows that majority of the participants disagreed that there is a structured M&E policies with mean response of 2.2 and standard deviation is 1.2 implying that structured M&E policies were not properly constituted in both dams. The results also showed that majority of the respondents disagreed that M&E personnel undertakes regular monitoring of the dam project to ensure that it is completed in time with mean response of 2.2 and standard deviation is 1.2 implying that monitoring and evaluation of the dams was not properly undertaken.

Further, majority of respondents disagreed that there is a thorough consideration all other project elements like project scope in managing of this dam project with mean response of 2.2 and standard deviation is 1.2 implying that project scope is not thoroughly considered. The study established that majority of the respondents disagreed that reasons why project at particular point failed or succeeded are identified and reported with mean response of 2.1 and standard deviation is 1.3 implying that contractors of the dams fail to give reasons why project at particular point failed or succeeded. Results also showed that majority of the respondents were disagreeing to the statement that early indications of the progress and

achievements of the project are periodically reported with mean response of 2.2 and standard deviation of 1.1 implying that early indications of the progress and achievements of the project are not adequately periodically reported.

Table 2: Project Monitoring & Evaluation

Project Monitoring & Evaluation	Strongly disagree	disagree	don't know	Agree	Strongly agree	Mean	SD
There is sufficient M&E personnel	28.1%	51.2%	2.5%	6.6%	11.6%	2.2	1.3
There is a structured M&E policies	27.3%	49.6%	3.3%	12.4%	7.4%	2.2	1.2
M&E personnel undertakes regular monitoring of the dam project to ensure that it is completed in time	32.2%	45.5%	2.5%	13.2%	6.6%	2.2	1.2
There is a thorough consideration all other project elements like project scope in managing of this dam project	33.1%	45.5%	2.5%	10.7%	8.3%	2.2	1.2
Reasons why project at particular point failed or succeeded are identified and reported	38.0%	41.3%	1.7%	10.7%	8.3%	2.1	1.3
Early indications of the progress and achievements of the project are periodically reported	28.1%	51.2%	3.3%	11.6%	5.8%	2.2	1.1
There is a dedicated team to undertake M&E	30.6%	47.1%	4.1%	14.0%	4.1%	2.1	1.1
Project inputs, process and outputs are periodically monitored and evaluated	30.6%	45.5%	5.8%	11.6%	6.6%	2.2	1.2
Project managers participate in continuous project tracking process	38.8%	25.6%	12.4%	13.2%	9.9%	2.3	1.4

Further, most respondents disagreed that there is a dedicated team that addresses the monitoring and evaluation aspects with mean response of 2.1 and standard deviation is 1.1 implying that dedicated team to oversee monitoring and evaluation of dams was inadequate. On the statement that project inputs, process and outputs are periodically monitored and evaluated, majority of the respondents disagreed with mean response of 21.2 and standard deviation is 1.2 implying that project inputs, process and outputs are not periodically monitored and evaluated. Most respondents also disagreed that project managers participate in continuous project tracking process with mean score for place is 2.3 and standard deviation is 1.4 implying that most project managers did not participate in continuous project tracking process which could impact dam completion time.

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4.1.2 Descriptive on Dam project completion

The study sought to determine the level of dam project completion based on some fundamental indicators. The results are shown in Table 3.

Table 3: Dam project completion

Dam project completion	Strongly disagree	disagree	don't know	Agree	Strongly agree	Mean	SD
Short term dam project deliverables are being implemented according to the set timelines	26.4%	39.7%	9.1%	9.1%	15.7%	2.4	1.4
Short term dam project deliverables are being implemented according to the cost/budget provisions	26.4%	41.3%	5.0%	15.7%	11.6%	2.4	1.3
Sections of the dam project so far completed have been implemented according to the intended quality standards	34.7%	33.9%	5.8%	9.9%	15.7%	2.4	1.4
Sections of the dam project so far completed observed set technical requirements	28.1%	43.0%	6.6%	12.4%	9.9%	2.3	1.3
Sections of the dam project so far completed are to the satisfaction of the user and government	31.4%	35.5%	7.4%	9.9%	15.7%	2.4	1.4
Sections of the dam project completed were evaluated according to set objectives	24.0%	44.6%	8.3%	8.3%	14.9%	2.4	1.3

Most respondents did not agreed that short term dam project deliverables are being implemented according to the set timelines with mean response of 2.4 and standard deviation of 1.3 implying that short term dam project deliverables were not attained in time. It was also found that short term dam project deliverables were not implemented according to the cost/budget provisions as indicated by mean response of 2.4 and standard deviation of 1.3. It was also established that the sections of the dam project so far completed were not implemented according to the intended quality standards as indicated by mean response of 2.4 and standard deviation of 1.4. Further, it was revealed that the sections of the dam project so far completed did not observer set technical requirements as indicated by mean response of 2.3 and standard deviation of 1.3. Regarding, the statement that sections of the dam project so far completed are to the satisfaction of the user and government, majority of the respondents did not agree with mean response of 2.4 and standard deviation of 1.4 implying that the sections of the dam completed are not up to the satisfaction level of the users and government. Finally, most of the sections of the dam project completed were not evaluated according to set objectives as shown by mean response of 2.4 and standard deviation of 1.3.

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4.2 Factor Analysis

Factor analysis is done to show the degree to which a research instrument measures what it is expected to measure (Loehlin & Beaujean, 2016). To examine whether the statements/indicators are adequate and appropriate for inferential statistical tests, factor analysis, was conducted using Principal Components Method. For a data set to be regarded as adequate and appropriate for statistical analysis, the factor loading value should be greater than 0.45 (DiStefano & Hess, 2005). For Principal Components Method, extraction value of more than 0.45 is retained for further analyses (Jombart, Devillard & Balloux, 2010).

4.2.1 Measures of Project Monitoring & Evaluation

Factor analysis for the measures of project monitoring & evaluation was conducted using Principal Components Method (PCM) approach and statements/constructs that attracted a coefficient of more than 0.45 hence were retained for further analysis in regression. Results of the factor analysis are presented in Table 4.

Table 4: Factor loading for measures of project monitoring & evaluation

Statement/construct/indicator	Factor loadings
There is sufficient M&E personnel	.679
There is a structured M&E policies	.733
M&E personnel undertakes regular monitoring of the dam project to ensure that it is completed in time	.733
There is a thorough consideration all other project elements like project scope in managing of this dam project	.707
Reasons why project at particular point failed or succeeded are identified and reported	.692
Early indications of the progress and achievements of the project are periodically reported	.740
There is a dedicated team that addresses the monitoring and evaluation aspects	.692
Project inputs, process and outputs are periodically monitored and evaluated	.739
Project managers participate in continuous project tracking process	.578

As shown in Table 4, the statement that there are sufficient M&E personnel had a component coefficient of .679. It was also found that the statement that there is a structured M&E policies had a component coefficient of .733. The statement that M&E personnel undertakes regular monitoring of the dam project to ensure that it is completed in time had a component coefficient of .733 while the statement that there is a thorough consideration all other project elements like project scope in managing of this dam project had a component coefficient of .707.

Further, the statement that the reasons why project at particular point failed or succeeded are identified and reported had a component coefficient of .692 while the statement that early indications of the progress and achievements of the project are periodically reported had a component coefficient of .740. It was also revealed that the statement that there is a dedicated

team that addresses the monitoring and evaluation aspects had a factor loading of .692, the statement that project inputs, process and outputs are periodically monitored and evaluated had factor loading of .739 while the statement that project managers participate in continuous project tracking process had factor loading of .578.

From the results of principal component analysis, it is evident that all statements/constructs for project monitoring & evaluation had factor loadings of more than 0.45 and hence were viable measures of project monitoring and evaluation. The measures of monitoring and evaluation are deemed essential in the completion of dam projects and were retained for further analysis in regressions.

4.2.2 Measures of Dam project completion

Factor analysis for the measures of dam project completion were conducted using Principal Components Method (PCM) approach and statements/constructs that attracted a coefficient of more than 0.45 hence were retained for further analysis in regression. Results of the factor analysis are presented in Table 5.

Table 5: Factor loading for measures of dam project completion

Statement/construct/indicator	Factor loadings
Short term dam project deliverables are being implemented according to the set timelines	.637
Short term dam project deliverables are being implemented according to the cost/budget provisions	.711
Sections of the dam project so far completed have been implemented according to the intended quality standards	.715
Sections of the dam project so far completed observed set technical requirements	.774
Sections of the dam project so far completed are to the satisfaction of the user and government	.778
Sections of the dam project completed were evaluated according to set objectives	.803

The indicator that short term dam project deliverables are being implemented according to the set timelines had a component coefficient of .637. It was also found that the measure that short term dam project deliverables are being implemented according to the cost/budget provisions had a component coefficient of .711. The measure that sections of the dam project so far completed have been implemented according to the intended quality standards had a component coefficient of .715 while the statement that sections of the dam project so far completed observed set technical requirements had a component coefficient of .774.

Further, the measure that the sections of the dam project so far completed are to the satisfaction of the user and government had a component coefficient of .778 while the construct that the sections of the dam project completed are evaluated according to set objectives had a component coefficient of .803. From the results of principal component analysis, it is evident that all statements/constructs for dam project completion had factor loadings of more than 0.45 and hence were viable measures of dam project completion. The measures of dam project completion are therefore deemed critical in the performance of dam projects and were retained for further analysis in regressions.

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4.3 Pearson Correlation Analysis

Pearson correlation analysis was carried out to determine whether there were significant associations between monitoring & evaluation and dam project completion across Mwache and Mukurumudzi Dam. Correlation results are shown in Table 6.

Table 6: Comparative correlation matrix

Dam			Dam project completion	Project Monitoring &Evaluation
Mwache Dam	Dam project completion	Pearson Correlation	1.000	
		Sig. (2-tailed)		
	Project Monitoring and Evaluation	Pearson Correlation	.793**	1.000
Mukurumudzi Dam	Dam project completion	Pearson Correlation	1.000	
		Sig. (2-tailed)		
	Project Monitoring and Evaluation	Pearson Correlation	.823**	1.000

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

Pearson correlation showed that there was significant positive association between project monitoring and evaluation and dam project completion for Mwache Dam (r_1=.793, p=0.000). It was also found that there was significant positive association between project monitoring and evaluation and dam project completion for Mukurumudzi Dam (r_2=.823, p=0.000).

Pearson correlation showed that there was significant positive association between project monitoring and evaluation and dam project completion for both Mwache Dam and Mukurumudzi Dam implying that project monitoring and evaluation and dam project completion move in the same direction. However, the association between project monitoring and evaluation and dam completion was strongest for Mukurumudzi Dam implying that project monitoring and evaluation was better conducted at Mukurumudzi compared to Mwache Dam.

4.4 Regression analysis

Table 7 shows R square results. Dam project completion was regressed against project monitoring and evaluation. The regression analysis was conducted at 5% significance level. The study obtained the model summary statistics as shown in Table 7.

Table 7: Comparative model summary results across dams

Dam	R	R Square	Adjusted R Square	Std. Error of the Estimate
Mwache	.793[a]	.630	.624	.69255
Mukurumudzi	.823[a]	.677	.671	.67168

a. Predictor: (Constant), project monitoring and evaluation

In Table 7, R squared, is the coefficient of determination indicates the deviations in the response variable that is as a result of changes in the predictor variables. From the outcome in Table 7, the value of R square was .630, indicating that 63.0 percent of the variation in the dam project completion at Mwache Dam construction are explained by project monitoring

and evaluation. Moreover, project monitoring and evaluation was found to have explained 67.7 percent of dam project completion of Mukurumudzi dam. Comparative model summary results across the two dams imply that contractors who built Mukurumudzi dam observed project monitoring and evaluation as a very essential element in the management of dam projects compared to Mwache Dam. Table 8 shows the ANOVA results of the study.

Table 8: Comparative Anova results across the two dams

Dam	Model	Sum of Squares	df	Mean Square	F	Sig.
Mwache	Regression	49.735	1	49.735	103.695	.000[b]
	Residual	29.257	61	.480		
	Total	78.992	62			
Mukurumudzi	Regression	52.907	1	52.907	117.271	.000[b]
	Residual	25.264	56	.451		
	Total	78.171	57			

a. Dependent Variable: Dam project completion

b. Predictor: (Constant), project monitoring and evaluation

The significance value across the two dams is 0.000 which is less than p=0.05. The F calculated value for ANOVA results fetched from both Mwache Dam and Mukurumudzi dam were statistically significant implying the two models were satisfactory. The F value derived indicates that the data used was linear and therefore can be used for regression analysis. The comparative regression results as fetched Mwache and Mukurumudzi dam is shown in Table 9.

Table 9: Comparative Regression results for Mwache and Mukurumudzi

Dam	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
Mwache Dam	(Constant)	.393	.212		1.851	.069
	Project monitoring and evaluation	.892	.088	.793	10.183	.000
Mukurumudzi Dam	(Constant)	.502	.203		2.476	.016
	Project monitoring and evaluation	.850	.079	.823	10.829	.000

a. Dependent Variable: Dam project completion

[*]Sig at 10% [**]sig at 5% [***]sig at 1%

Regression of coefficients showed that is a positive and significant relationship between project monitoring & evaluation and dam project completion for both Mwache Dam (β_1=.892, p=0.000) and Mukurumudzi Dam (β_2=.850, p=0.000). The regression of coefficient implies that if project monitoring and evaluation by Mwache contractors is increased by one unit, dam project completion will increase by .892 units. Coefficient results also showed that unit increase in project monitoring and evaluation by Mukurumudzi Dam contractors had resulted to .850 unit increase in dam project completion.

Effective Monitoring and Evaluation of projects is usually one of the ingredients of good project performance. Monitoring and Evaluation is important because it provides the only consolidated source of information showcasing the project's progress by allowing actors to learn from each other's experiences, building on expertise and knowledge. Monitoring and evaluation can help identify problems and their causes and suggest possible solutions to problems.

Monitoring and evaluating is essential in ensuring that dam projects are being undertaken against set budget, time, scope and technical specification to ensure that the project are completed in time and in quality standard and user satisfaction. The results concur with Titomet (2017) who determined influence of monitoring and evaluation on performance of water projects in Kenya and found that monitoring and evaluation have a positive and significant relationship with performance of water projects.

Moreover, Higgins *et al.* (2011) while researching on project monitoring found that monitoring and evaluating is essential in ensuring that dam projects are being undertaken against set budget, time, scope and technical specification. The results agree with The results agree with Ogolla and Moronge (2016) who conducted a study on the determinants of effective monitoring and evaluation of government funded water projects in Kenya the case of Nairobi County and revealed that monitoring and evaluation influence the sustainability of water projects.

5.0 Conclusions

The study concludes that that project monitoring and evaluation influences dam completion in time. Project monitoring and evaluation generally outlines the underlying assumptions on which the achievement of project goals depend, the anticipated relationships between activities, outputs, and outcomes- the logical framework. Monitoring and Evaluation is important because it provides the only consolidated source of information showcasing the project's progress while identifying problems and their causes and suggest possible solutions to problems.

6.0 Recommendations

It was established that project monitoring & evaluation is a critical process in the construction of a dam. The study recommends for the adherence of proper project monitoring and evaluation techniques to ensure timely completion of dam projects. Monitoring and evaluation of the dam need to periodic as it will help identify defects in the construction at the earliest time possible and corrective action taken. Effective project monitoring and evaluation enhances the basis for evidence-based project management decisions. Monitoring and evaluation enable one to assess the quality and impact of a project, against project plans and work plan. There may be need for monitoring and evaluation training and workshops to sharpen staff's monitoring and evaluation skills.

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