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Project Surveillance and Performance of Mega Dam Projects in Kenya

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ABSTRACT

Purpose: The aim of this study was to determine the influence of project surveillance on performance of mega dam projects in Kenya.

Methodology: The study adopted a descriptive research design. The study targeted the 19 dam projects in the different counties in Kenya that were completed after independence. The study population was 300 project team members in charge of the projects. The study sample size was 171 respondents. The stratified random sampling was used to select the different project team members. Primary data was used in this study and it was collected using both closed and open questionnaire. Data was analyzed using the descriptive and inferential statistics. Pearson R correlation was used to measure strength and the direction of linear relationship between variables. Advanced statistical models that include diagnostic tests, multicollinearity and normality tests were conducted before performing the multiple regressions model. Multiple regression models were fitted to the data in order to determine how the independent variables affect the dependent variable. ANOVA was used to check the overall model significance.

Findings: The study found that project surveillance positively and significantly influences performance of mega dam projects in Kenya.

Unique Contribution to Theory, Practice and Policy: The study contributes to theory by strengthening project management control theories by confirming that project surveillance significantly enhances performance outcomes in mega dam projects. For practice, it recommends the adoption of continuous monitoring systems, regular site inspections, and advanced tracking technologies to improve project efficiency and early detection of deviations. For policy, it suggests the establishment of formal surveillance frameworks and regulatory requirements that enforce transparent reporting and continuous oversight in public infrastructure projects.

Key Words: *Project Surveillance, Mega Dam Projects, Surveillance Theory*

INTRODUCTION

Background to the Study

For over 5,000 years, civilizations have continuously refined their methods of utilizing water for various purposes, including navigation, irrigation, flood control, industrial applications, and wildlife conservation. Historical trends reveal that early dams were strategically constructed to provide vast areas with water, enabling agricultural productivity to sustain growing populations. In modern times, the efficient operation of dam projects remains a critical concern, ensuring a stable water supply for domestic, commercial, agricultural, and environmental purposes. In the context of mega dam projects, successful project performance is a multifaceted achievement requiring adherence to timelines, budget constraints, quality standards, and user preferences while meeting complex technical requirements (Haarstrick & Bahadir, 2022). The criteria for project performance also encompass completion within budget, adherence to schedules, high-quality workmanship, and conformance to scope. The interdependence of cost, time, scope, and quality remains central to the successful execution of such projects, with each factor influencing overall project efficiency.

The performance indicators for mega dam projects extend beyond financial and time constraints to include compliance with technical specifications, environmental sustainability, and safety regulations (Ngcobo, 2023). These indicators not only determine the overall success of a project but also emphasize the broader responsibilities associated with dam construction, including long-term environmental and social sustainability. However, achieving and maintaining such high-performance standards requires a structured Quality Management System (QMS) to ensure process consistency, continuous monitoring, and adherence to international best practices.

A Quality Management System (QMS) provides an integrated framework that enhances project efficiency, reliability, and quality assurance. According to Maruszewska (2025), a QMS enables effective process control, systematic monitoring, and continuous improvement in project execution. Research by Mashwama, Aigbavboa, and Thwala (2023) highlights the critical role of QMS in preventing poor project quality and ensuring that dam construction meets both technical and regulatory requirements. However, Mohamed (2023) argues that a lack of awareness, misconceptions, and limited technical capacity among project teams can hinder the effective implementation of QMS, leading to cost overruns, quality lapses, and project inefficiencies. To ensure continuous improvement, project leaders must demonstrate full commitment to the principles of quality management, particularly in the planning, execution, and monitoring of large-scale projects. The fundamental principles of QMS, as outlined in ISO 9001:2015, provide a structured approach for ensuring project consistency and success, (Dzulkifli et al 2021). These principles guide the planning, execution, and evaluation of large-scale infrastructure projects, ensuring compliance with technical, environmental, and stakeholder expectations.

The successful implementation of QMS in mega dam projects enhances efficiency, sustainability, and stakeholder confidence. A study by Adegbite et al. (2023) found that dams constructed with structured QMS frameworks demonstrated higher performance in water storage, irrigation capacity, and hydropower output compared to those without formalized quality management systems. However, challenges such as resistance to change, lack of awareness, and resource constraints continue to hinder QMS adoption in dam construction (Mwaniki & Rambo, 2022). Addressing these challenges requires capacity-building initiatives, integration of digital monitoring systems, and compliance with ISO 9001:2015 standards.

Mega dam projects are large-scale water infrastructure developments designed to store, regulate, and manage vast quantities of water for multiple uses, including irrigation, hydropower generation, flood control, and domestic and industrial supply. These projects play a critical role in ensuring water security and socio-economic development, particularly in regions facing water scarcity and climate variability (Ndehedehe, 2023). The construction of mega dams has historically been viewed as a long-term strategic solution for mitigating floods, increasing agricultural productivity, and securing a reliable energy supply.

Kenya faces a severe water scarcity problem, with an annual internal water availability of only 636 cubic meters per capita, far below the globally recognized threshold for water sufficiency (Thomas-Possee, 2023). The country's increasing population and expanding agricultural and industrial sectors have placed additional pressure on its limited water resources, necessitating significant investments in large-scale water storage infrastructure. In response, the Kenyan government has prioritized mega dam construction to enhance water security, improve irrigation capacity, and generate hydropower as part of its Vision 2030 development agenda (Asokan et al., 2020). The National Water Harvesting and Storage Strategy (2020–2025) outlines Kenya's commitment to increasing its water storage capacity from the current 124 million cubic meters to 4.5 billion cubic meters by 2030, ensuring a reliable supply for domestic, agricultural, and industrial use (Mulwa, 2021).

Kenya's mega dam projects play a critical role in addressing water scarcity, mitigating the effects of climate change, and supporting economic growth. The government has focused on the development of large reservoirs that can store vast amounts of water to be used during periods of drought and fluctuating rainfall. Mega dams also serve a multi-functional role, providing water for irrigation, urban supply, flood control, and hydropower generation. By investing in large-scale dam projects, Kenya aims to achieve long-term water security while reducing its dependence on seasonal rainfall for agriculture and domestic consumption (National Water Harvesting and Storage Authority, 2023).

Several mega dam projects in Kenya highlight the country's commitment to expanding its water infrastructure. The Masinga Dam, the largest reservoir in the country, provides critical irrigation and hydroelectric power for the national grid. Turkwel Dam serves multiple purposes, including water storage, irrigation, and hydropower production, contributing to economic development in arid and semi-arid regions. Thiba Dam, a recently completed project, was developed to enhance rice irrigation in the Mwea region, reducing Kenya's reliance on rice imports and promoting food security (Mwai et al., 2022). These projects reflect Kenya's strategic approach to large-scale water storage and resource management.

Despite the benefits, Kenya's mega dam projects face several challenges that hinder their effectiveness. Financial constraints remain a significant issue, with many projects experiencing budget shortfalls and delays in funding, leading to prolonged construction timelines and incomplete projects (Mulwa, 2021). Governance and corruption concerns have also affected the sector, with reports of mismanagement and procurement irregularities slowing progress (Mwai et al., 2022). Environmental and social impacts, including the displacement of local communities and ecological disturbances, require more comprehensive mitigation strategies to balance development with sustainability (Berendes et al., 2023).

Another key challenge is the technical and logistical complexity of mega dam projects. Delays in project implementation, inefficiencies in contractor performance, and regulatory challenges have resulted in slow project execution and underutilization of completed infrastructure (Asokan et al., 2023). The lack of integration of modern quality management systems in project execution has also been identified as a factor contributing to inefficiencies in Kenya's water infrastructure development. Adopting best practices in project management, increasing stakeholder engagement, and ensuring adherence to global standards will be critical in improving the performance and sustainability of Kenya's mega dam projects.

As Kenya continues to expand its water infrastructure, addressing these challenges through improved governance, strategic financing, and environmental conservation measures will be essential. Ensuring that mega dam projects align with international quality and sustainability standards will not only enhance their efficiency but also contribute to long-term national development goals. The integration of quality management systems, better policy frameworks, and transparent decision-making processes will be key in ensuring that Kenya's mega dam projects fulfill their intended purpose and provide lasting benefits to the population.

Statement of the Problem

Kenya's Vision 2030 presents an ambitious roadmap for socio-economic transformation, placing mega dam infrastructures at the heart of national development (Kanda, Lusweti, & Odhiambo, 2023). These projects are envisioned to ensure water security, boost agricultural production through irrigation and supply clean energy to power industrialization and rural development (Government of Kenya, 2020). However, while the vision is bold and inspiring, many of these mega dams have significantly underperformed due to systemic failures in project quality management systems, revealing a consistent and troubling pattern of inefficiencies across Kenya (Baraza, 2020).

Bongei et al (2024) noted that project quality planning has a statistically significant impact on dam performance, with a correlation coefficient of $r = 0.869$ ($p < 0.05$) indicating that nearly 75% of performance variance in mega dam projects can be attributed to quality planning and related processes. Thwake Multipurpose Dam, initially budgeted at KSh 36.97 billion, has experienced a 32% cost overrun, reaching an additional KSh 9.3 billion. Moreover, environmental assessments indicate potential water contamination from upstream pollution, raising concerns about its viability (Kenya News Agency, 2024).

Mwashuma, and Kisimbii (2020) found that out of the 57 mega dam projects initiated by the government since 2009, only 20% have been completed successfully and majority of them have stalled. The Badasa Dam project in Marsabit County was envisioned as a pivotal component to enhance water security and foster socio-economic development in arid regions (Lango, 2024). Despite its strategic importance, the project has faced significant setbacks. Construction stalled by 2011 after approximately KES 2 billion had been expended.

Otieno (2024) highlights inefficiencies in Kenya's water service delivery caused by weak coordination, overlapping mandates, and limited autonomy, leading to resource duplication, delayed policies, and poor accountability, which undermine program performance across government and NGOs. Additionally, the World Bank's 2023 sector review underscores that despite numerous strategic plans, 41% of rural and 28% of urban households still lack reliable water access, primarily due to ineffective implementation and coordination. The Sondu-Miriu Hydropower Project experienced a four-year delay and an 11% cost overrun, largely attributed to weak quality assurance mechanisms and risk management (Kiplagat & Wang, 2021). Kenya's Vision 2030 projected a long-term electricity generation capacity of approximately 22,000 MW, aiming to support industrialization and universal energy access Takase, Kipkoech & Essandoh (2021). However, as of 2024, the actual installed capacity is approximately 3,038 MW, indicating a significant gap between planned and actual performance

The absence of robust, enforceable quality management frameworks undermines project timelines, budgets, and ultimate functionality. Audits have shown that fewer than 30% of public infrastructure projects in Kenya undergo rigorous quality vetting (Office of the Auditor General, 2024), exposing significant vulnerabilities in governance, oversight, and execution.

Water supply coverage in Kenya is estimated at 57%, and per capita water availability is estimated at approximately 647m3 per person per year (FAO, 2020), which is significantly lower than the UN's benchmark of 1,000 m3 per capita per year. Despite the country's irrigation potential estimated at 1.34 million hectares, less than 16% has been realized (Njiru, 2021). This under-utilization is compounded by climate-related risks, inadequate infrastructure development, and poor inter-agency coordination, which continue to hinder effective water resource management and agricultural transformation (Otieno, 2024). Several research on quality management and project performance have been undertaken locally. Nderitu and Nyaegah

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(2020) on determinants for adoption of quality Management system on projects implementation in the County Governments in Kenya revealed that the cost of project increased than budgeted.

Currently, less than 35% of mega infrastructure projects in Kenya meet their original quality and performance targets (National Infrastructure Authority, 2023). This alarming statistic signals an urgent need to interrogate how quality management systems impact mega dam project outcomes. This study sought to bridge this gap by critically establishing the influence of project surveillance on performance of mega dam projects in Kenya.

General Objective of the Study

The general objective of the study was to establish the influence of project surveillance on performance of mega dam projects in Kenya

LITERATURE REVIEW

Theoretical Framework

Surveillance Theory

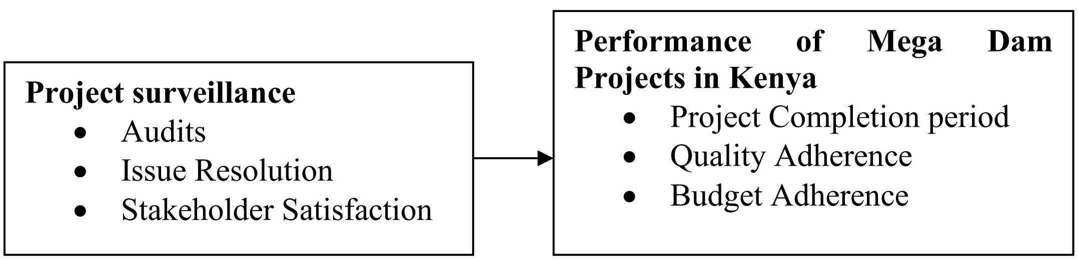
Surveillance Theory founder was Jeremy Bentham in nineteenth-century 'the Panopticon' concept which was to bring reforms in prison. Surveillance in modern society begun with Foucault's 1977 application of Bentham's concept of the Panoptic concept to explore the relationship between architecture, knowledge, and power. Bentham argued in the "Panopticon" that the perfect prison would be structured in a such a way that cells would be open to a central tower. In the model, individuals in the cells do not interact with each other and are constantly confronted by the panoptic tower (pan=all; optic=seeing). They cannot, however, see when there is a person in the tower; they must believe that they could be watched at any moment. In the mid-1990s, it has now become a household word. Yet there is considerable ambiguity as to the meaning of surveillance. Everyday uses and dictionary definitions of surveillance seem to capture only partially current realities of surveillance. Surveillance is commonly defined as 'close observation, especially of a suspected person' or as 'the act of carefully watching someone or something especially in order to prevent or detect a crime'. However, most surveillance technologies today are not especially applied to suspected persons, but rather indiscriminately and ubiquitously, to everyone and in all contexts—all places, times, networks and groups of people (Marx, 2022)

David Lyon, a key surveillance theorist, offers this definition: surveillance is 'the focused, systematic and routine attention to personal details for purposes of influence, management, protection or direction' (Lyon 2021) while Haggerty and Ericson (2020) define surveillance as collection and analysis of information about populations in order to govern their activities. But to understand what surveillance actually entails, we need to look more deeply into the theoretical insights produced by the complex field of surveillance studies. The goal of surveillance is to reform the individual, in order to create self-discipline. This theory is linked to the fourth variable in this study to depict close monitoring and evaluation of dam projects.

However, the criticism of surveillance theory ascertains a lack of critical thinking about surveillance, questions the existence of something called "surveillance studies" as opposed to a critical theory of society.

Conceptual Framework

The conceptual framework shows the relationship between the independent and dependent variables. The framework helps the reader see at a glance the proposed relationships between the variables in the study graphically or diagrammatically. Orodho (2019) defines a conceptual framework as a graphical or a diagrammatical model of presentation of the relationship between variables in the study. It is a road map that the study intends to follow with the aim of looking for answers to the problems raised by the research questions. The independent variable is project surveillance while the dependent variable is project performance.



Independent Variables **Dependent Variables**

Figure 1: Conceptual Framework

Project Surveillance

Effective project requires a carefully measured balance between prudent and effective risk taking, allowing skilled project teams the flexibility to tailor and improve processes to enhance success and effective surveillance (assurance) to ensure the project's objectives are being achieved (Burga & Rezania, 2023). Good project management, requires appropriate and timely action to mitigate or remove risks that can sensibly be managed. The role of project surveillance systems should be focused on assuring the organization's senior management and other stakeholders that their project management teams are making the best decisions to protect and enhance the overall value of the projects (Allen, Carpenter, Hutchins, & Jones, 2024).

It consists of regular systematic collection and analysis of information to track the progress of the project implementation against pre-set targets and objectives. It is an important management tool which, if used properly, provides continuous feedback on the project implementation progress as well assists in the identification of potential successes and constraints to facilitate timely decisions (Doskočil, 2022). Effective monitoring of the project is a critical element of good project management. It supports informed and timely decision making by the management and provides accountability for achieving results. It is a key part of project cycle management. It is to be built into the project at the planning stage. It is not an 'add on' tool which can be used during mid-way of the project implementation. On the other hand, it is to be woven throughout the project (Burga & Rezania, 2023).

Evaluation is an important aspect of project management It can facilitate the successful completion of the project, and inform decisions about the future of both the project at hand and other projects. The purpose of any evaluation is to provide information for action (e.g., decision-making, strategic planning, program modification). Once evaluation information is available, it should be distributed among the project stakeholders and integrated into management practices. If this is not done, evaluation is a waste of organization resources (Burga & Rezania, 2023).

Project review is a process of examining and auditing planned tasks, activities, procedures, events and other work components of a project to identify whether the project's requirements can be fully addressed by the planned amount of work and to determine what additional resources are necessary to match the work with the requirements. It is an attempt to align current working environment with the requirements prior to the project implementation process gets started. The purpose of the project review process is to provide a team with a clear and unambiguous understanding of the steps required to complete the project as per requirements (Collins, Parrish & Gibson, 2023).

Empirical Review

Project Surveillance and Performance of Mega Dam Projects

In China, Zhen (2025) researched on the application of data analysis and interpolation method of safety monitoring system in a water conservancy project. Taking the application of DSIMS4.0 system developed by Nan Jing Nan Rui Group Co. ltd. in Xinjiang water conservancy project as an example, the study summarized the scientific support of the system for dam operation performance analysis and effective management of dam. The study revealed that the foundation curtain has good seepage prevention effect at present. Regression analysis showed process of unsteady seepage flow spreading downstream and the characteristics of viscosity.

Song, Liu and Yang (2023) researched on dam safety evaluation method after extreme load condition based on health monitoring and deep learning in China. This study proposed a novel data-driven fusion model for a dam safety evaluation after extreme load based on monitoring data derived by sensors. First, the relationship between dam environmental quantity and effect quantity is deeply excavated based on bidirectional long short-term memory (BiLSTM) network, which is a deeply improved LSTM model. Second, conducting the constructed SSA-BiLSTM model to estimate the change law of dam effect quantity after the extreme load. Project case showed that the multiple quantitative prediction accuracy evaluation indicators of the proposed method are significantly superior to the comparison method, with mean absolute percentage error (MAPE) and mean absolute error (MAE) values decreasing by 30.5% and 27.8%, respectively, on average. The proposed model can accurately diagnose the dam safety state after the extreme load compared with on-site inspection results of the engineering department, which provides a new method for dam safety evaluation.

Noor (2020) researched on influence of monitoring practices on projects performance at the water sector trust fund in Kenya. The study generally determined how monitoring practices influence projects performance at the water sector trust fund. Specifically, the study focused on how monitoring planning, monitoring tools, monitoring techniques and adoption of monitoring practices influences project performance. Adoption of descriptive research design was adhered to. The target population consisted of 275 persons drawn from various departments in the organization. This study utilized primary data using semi-structured questionnaire. Analysis of data followed a descriptive analysis as well as the inferential analysis such as the application of regression. The study established that monitoring planning, monitoring tools, monitoring techniques and adoption of monitoring practices had a positive and significant relationship with project performance. The study concluded that a well-planned M&E helps the project team to get a better understanding of the target population's needs which helps to define the scope of the project and design objectives that are relevant, measurable and achievable.

Munge, Wasike and Mungai (2020) did an investigation on the influence of project monitoring and evaluation on completion time of Mwache Dam and Mukurumudzi Dam in Kwale County. This study 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 project managers, project super indents, site engineers, financial consultants and community representatives. 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 and evaluation and dam project completion for both Mwache Dam and Mukurumudzi Dam. The study concluded that project monitoring and evaluation influences dam project completion time.

RESEARCH METHODOLOGY

The study used Positivism research philosophy. The study adopted a descriptive research design. It is an effective method to get information that can be used to develop hypotheses and propose associations. Hence, it was used to assess the influence of design control on performance of mega dam projects in Kenya.

This study focused on 19 mega dam projects in Kenya, as identified by the Ministry of Water, Sanitation, and Irrigation (2023). These dams are strategically distributed across various

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counties, including Thwake Dam (Makueni), Masinga Dam (Machakos), Thiba Dam (Kirinyaga), Chemususu Dam (Baringo), Koru-Soin Dam (Kisumu/Kericho), and others listed in Appendix V. These dams were selected based on their classification by the Ministry of Water, Sanitation, and Irrigation (2023) as mega dam projects.

The unit of observation consists of 300 key personnel involved in the planning, implementation, and management of these projects. The study targets: Project Managers – Overseeing construction and implementation; Project Coordinators – Ensuring day-to-day project execution aligns with objectives; Project Administrators – Handling project documentation and compliance; Project Analysts – Evaluating performance metrics; Project Directors – Providing high-level strategic guidance; and Project Steering Committee Members – Representing stakeholders and ensuring regulatory compliance. In this study the sample frame was the list of mega dam projects distributed in different counties in Kenya.

The sample size is a term used for defining the number of subjects included in a sample size. The study sample size was selected from the project team population. The study used Yamane (1967) formula to calculate the sample as

The study sample size was 171 respondents. This was 57% of the study population. According to Mugenda (2019), a sample size of at least 30% is adequate for a study. The stratified random sampling was used to select the different project team members.

Primary data was used in this study and it was collected using a questionnaire. Pilot was hence conducted with 17 respondents selected randomly from the target population who were not included in the actual study. The pilot helped to determine the reliability and validity of the research instrument.

Data collected was checked for completeness and edited. Data was analyzed by use of SPSS version 26.0 and excel. Data was analyzed using the descriptive and inferential statistics. Descriptive analysis included variability measurements such as range, variance, and standard deviation, dispersion and central tendency metrics such as mean, mode, and median. Inferential statistics include the correlational and regression analysis. Pearson R correlation will be used to measure strength and the direction of linear relationship between variables.

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FINDINGS AND DISCUSSION

Descriptive Analysis of Study Variables

Descriptive analysis was conducted to summarize the responses on project surveillance and performance of mega dam projects. The analysis involves the computation of frequency distributions, mean scores, and standard deviations to assess respondents' level of agreement with various statements related to each variable. The findings provide insights into the extent of implementation and perceived influence of project surveillance in mega dam projects in Kenya. A 5-point likert scale of Strongly Disagree, Disagree, Moderate, Agree, or Strongly Agree was used. The findings and discussions are presented in sub-sections below.

Project Surveillance

The first objective of the study was to establish the influence of project surveillance on performance of mega dam projects in Kenya. Project surveillance involves continuous monitoring, auditing, and corrective actions to ensure compliance with project objectives and stakeholder expectations. It is a critical quality assurance mechanism that enhances transparency, accountability, and performance improvements in mega dam projects. Respondents were asked to provide their level of agreement with various statements on project surveillance. Table 3 presents summary of the findings obtained.

The findings on project surveillance indicate that transparency and accountability mechanisms are strongly embedded in mega dam projects. A significant proportion of respondents (51%) agreed and (22.2%) strongly agreed that frequent audits are conducted to ensure transparency, with a mean score of 3.890 (SD = 0.849). This implies that project audits play a critical role in governance and risk management, aligning with Doskočil (2022), who highlighted that continuous surveillance enhances project effectiveness and prevents mismanagement. Project audits are essential in monitoring financial allocations, ensuring adherence to planned schedules, and preventing corruption in large-scale infrastructure projects.

Additionally, 49.7% of respondents agreed and 20.3% strongly agreed that issues and complaints within the project are resolved within the stipulated time. With a mean of 3.857 (SD = 0.868), the findings suggest that proactive monitoring ensures that grievances and operational challenges are addressed in a timely manner, reducing the risk of prolonged disputes. This supports Noor (2020), who established that effective project surveillance improves efficiency and stakeholder satisfaction by ensuring smooth operations and timely interventions in case of challenges.

The results further reveal that stakeholder satisfaction is regularly assessed to improve project implementation, with 50.3% of the respondents agreeing and 21.6% strongly agreeing. The mean score of 3.882 (SD = 0.860) suggests that project managers prioritize stakeholder engagement, ensuring their concerns and expectations are met. This aligns with findings by Munge, Wasike, and Mungai (2020), who argued that regular engagement with stakeholders leads to better project

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outcomes as their insights and feedback contribute to improved decision-making and conflict mitigation.

Moreover, the presence of an independent project surveillance committee received mixed responses, with 48.4% of respondents agreeing and 22.2% strongly agreeing. However, a notable proportion (22.9%) remained neutral, with a mean score of 3.825 (SD = 0.872). This suggests that while surveillance committees are present in many projects, their effectiveness may vary. Collins, Parrish, and Gibson (2023) emphasize that independent surveillance bodies enhance objectivity in project oversight, ensuring compliance with quality and regulatory standards.

The use of monitoring data to drive continuous improvement was confirmed by 52.3% of respondents agreeing and 20.3% strongly agreeing, with a mean score of 3.890 (SD = 0.861). This highlights the role of data-driven decision-making in improving project processes and mitigating risks. According to Burga and Rezania (2023), projects that incorporate continuous feedback and real-time data monitoring experience fewer delays and cost overruns, leading to enhanced performance. The effectiveness of corrective actions taken based on audit and monitoring reports was also acknowledged, with 51% agreeing and 22.2% strongly agreeing (Mean = 3.870, SD = 0.865). This demonstrates the responsiveness of project teams in addressing identified gaps, reinforcing the findings of Allen et al. (2024), who noted that well-executed corrective actions prevent project failures and optimize resource utilization.

Lastly, full disclosure of surveillance findings to project stakeholders was supported by 49.7% of respondents who agreed and 20.9% who strongly agreed, yielding a mean score of 3.855 (SD = 0.870). This suggests that information transparency is a priority in mega dam projects, ensuring that stakeholders remain informed about project progress, risks, and necessary adjustments. This aligns with Song, Liu, and Yang (2023), who emphasized that transparency in project surveillance fosters trust and enhances collaboration among stakeholders.

Overall, the findings indicate that project surveillance mechanisms are well integrated into the governance of mega dam projects, ensuring transparency, stakeholder involvement, and continuous improvement as supported by an aggregate mean of 3.867 and standard deviation of 0.864. These findings are consistent with Wambua & Cheruiyot (2020), who emphasize that effective project surveillance enhances stakeholder confidence and prevents project failures. The literature corroborates these findings by demonstrating the critical role of monitoring, evaluation, and corrective actions in enhancing project performance and minimizing risks. Effective surveillance strategies contribute to the overall success and sustainability of large-scale infrastructure projects, ensuring they meet the intended quality, cost, and time objectives.

Table 3: Descriptive Statistics for Project Surveillance

Statement	Strongly Disagree F(%)	Disagree F(%)	Moderate F(%)	Agree F(%)	Strongly Agree F(%)	Mean	Std. Dev.
The project undergoes frequent audits to ensure transparency.	1.3%	2.6%	22.9%	51.0%	22.2%	3.890	0.849
Issues and complaints are resolved within the stipulated issue resolution time.	2.0%	3.3%	24.8%	49.7%	20.3%	3.857	0.868
Stakeholder satisfaction is regularly assessed to improve project implementation.	2.0%	2.6%	23.5%	50.3%	21.6%	3.882	0.860
There is an independent project surveillance committee in place.	2.6%	3.9%	22.9%	48.4%	22.2%	3.825	0.872
Monitoring data is used to implement continuous improvements in the project.	2.0%	3.3%	22.2%	52.3%	20.3%	3.890	0.861
There are corrective actions taken based on audit and monitoring reports.	1.3%	2.6%	22.9%	51.0%	22.2%	3.870	0.865
There is full disclosure of surveillance findings to project stakeholders.	2.0%	3.3%	24.2%	49.7%	20.9%	3.855	0.870
Aggregate Score						**3.867**	**0.864**

Test for Hypothesis One

The first objective of the study was to establish the influence of project surveillance on performance of mega dam projects in Kenya. The corresponding hypothesis was project surveillance does not significantly influence performance of mega dam projects in Kenya.

A univariate analysis was therefore conducted to test the null hypothesis. From the model summary findings in Table 4, the r-squared for the relationship between project surveillance and performance of mega dam projects in Kenya was 0.278; this is an indication that at 95% confidence interval, 27.8% variation in performance of mega dam projects in Kenya can be attributed to changes in project surveillance. Therefore, project surveillance can be used to explain 27.8% change in performance of mega dam projects in Kenya. However, the remaining 72.2% variation in performance of mega dam projects in Kenya suggests that there are other factors other than project surveillance that explain performance of mega dam projects in Kenya.

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The study findings are in line with the results of Song, Liu and Yang (2023) who revealed that project Surveillance design influences projects performance

Table 4: Model Summary for Project Surveillance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.528[a]	.278	.277	.70542

a. Predictors: (Constant), project surveillance

The analysis of variance was used to determine whether the regression model is a good fit for the data. From the analysis of variance (ANOVA) findings in Table 5, the study found out that that Prob>$F_{1,\ 151}$= 0.000 was less than the selected 0.05 level of significance. This suggests that the model as constituted was fit to predict performance of mega dam projects in Kenya. Further, the F-calculated, from the table (58.338) was greater than the F-critical, from f-distribution tables (3.904) supporting the findings that project surveillance can be used to predict to predict performance of mega dam projects in Kenya. The study results concur with the findings of Munge, Wasike and Mungai (2020) who established that project surveillance influences project completion time

Table 5: ANOVA for Project Surveillance

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	15.518	1	15.518	58.338	.000[b]
1	Residual	40.216	151	0.266		
	Total	55.734	152			

a. Dependent Variable: performance of mega dam projects in Kenya

b. Predictors: (Constant), project surveillance

From the results in table 6, the following regression model was fitted.

$$Y = 0.288 + 0.357\, X_4$$

(X_4 is Project Surveillance)

The coefficient results showed that the constant had a coefficient of 0.288 suggesting that if project surveillance were held constant at zero, performance of mega dam projects in Kenya would be at 0.288 units. In addition, results showed that project surveillance coefficient was

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0.357 indicating that a unit increase in project surveillance would result in a 0.357 unit improvement in performance of mega dam projects in Kenya. It was also noted that the P-value for project surveillance was 0.000 which is less than the set 0.05 significance level indicating that project surveillance was significant. Based on these results, the study rejected the null hypothesis and accepted the alternative that project surveillance has a positive significant influence on performance of mega dam projects in Kenya. The study results are in line with the findings of Zhen (2025) who established that Project Surveillance influences performance of water conservancy project

Table 6: Beta Coefficients for Project Surveillance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.288	.075		3.840	.000
	project surveillance	0.357	0.092	0.358	3.880	0.000

a. Dependent Variable: performance of mega dam projects in Kenya

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Project Surveillance and Project Performance

The first null hypothesis test was 'Project surveillance does not significantly influence performance of mega dam projects in Kenya. The study found that project surveillance is statistically significant in explaining performance of mega dam projects in Kenya. The influence was found to be positive. This means that unit improvement in project surveillance would lead to an increase in performance of mega dam projects in Kenya. Based on the findings, the study concluded that project surveillance positively and significantly influences performance of mega dam projects in Kenya.

Recommendations

The study therefore recommends that management of mega dam projects in Kenya should implement agencies to establish comprehensive surveillance systems that provide continuous oversight throughout the project lifecycle. This can be achieved by integrating advanced monitoring technologies, conducting regular site inspections, and ensuring transparent reporting mechanisms to track progress and identify deviations early.

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