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PROJECT MANAGEMENT

WORKFORCE PLANNING PRACTICE AND PERFORMANCE OF MEGA DAM PROJECTS IN KENYA

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ABSTRACT

The purpose of the study was to examine the effects of workforce planning practice on performance of Mega dam projects in Kenya. This study was guided by Theory of Change, Agency Theory. The study targeted 322 registered civil engineers and registered land surveyors in Kenya as of the year 2023 and a sample size of 138 respondents was picked using Taro Yamane formular of sample calculation. Data collection instruments were structured questionnaire. The multiple regression analysis models were developed to establish the relationship between dependent and independent variables. Findings revealed that workforce planning practices have a significant positive relationship on performance of mega dam projects in Kenya. The results confirm that workforce planning is a key determinant of the successful execution of mega dam projects in Kenya. To enhance workforce planning and improve the performance of mega dam projects in Kenya, organizations should develop comprehensive workforce strategies aligned with project timelines, invest in continuous training programs to enhance employee skills, and adopt technology-driven workforce management tools for accurate labor forecasting.

Keywords: *Workforce Planning Practice, Performance, Mega Dam, Projects*

1. Introduction

Water is an essential natural resource that supports life, economic development, and environmental sustainability (Mutschinski, 2021). Despite its critical importance, approximately 768 million people worldwide lack access to improved water sources, with projections indicating that global water demand will rise by 50% by 2050. This increased demand is expected to be most significant in developing economies, where rapid population

growth and urbanization continue to strain water resources (Saeed et al., 2022). In Kenya, approximately 80% of the land is classified as arid or semi-arid (ASAL), accommodating only 20% of the country's population. These regions experience severe water scarcity due to erratic rainfall patterns and climate change, making access to safe and sustainable water sources increasingly challenging.

To address these water resource challenges, the Kenyan government has prioritized the development of mega dam projects as a crucial strategy for water conservation, irrigation, and agricultural expansion. These large-scale projects are designed to provide a stable water supply, enhance food security, and improve the livelihoods of communities affected by water scarcity (Müller-Mahn et al., 2021). However, the successful execution of such projects requires meticulous planning and resource allocation to prevent cost and time overruns, which have historically affected infrastructure projects (Merrow, 2024). Effective workforce planning practices are central to this process, ensuring that human resources are optimally utilized to enhance project performance and sustainability (Gheidar-Kheljani & Jahedi, 2024).

Workforce planning is a strategic approach to managing human resources that aligns an organization's workforce with its long-term project objectives. It involves systematically forecasting labor demand, assessing current workforce capabilities, and developing strategies to address gaps in staffing and expertise (Micheli et al., 2023). By integrating workforce planning into mega dam projects, project managers can ensure that the right personnel with the necessary skills are available at the right time, improving efficiency and reducing risks associated with labor shortages or skill mismatches (Kolter et al., 2024).

A key component of workforce planning is conducting a human resource inventory, which involves assessing the current workforce's skills, experience, and availability (Dahunsi, 2023). This process enables project managers to identify talent gaps and develop targeted recruitment and training initiatives to bridge them. Moreover, future workforce demand projections must consider technological advancements, project expansion, and evolving industry standards to ensure long-term project success (Sundaram, 2022). By aligning workforce supply with demand, project managers can proactively address labor shortages, minimize delays, and enhance operational efficiency.

Matching workforce supply with project demand is critical in determining project performance. Organizations must evaluate their current workforce capabilities against future project needs, identifying potential gaps that may hinder project execution (Ployhart & Morris, 2024). This analysis leads to the development of action plans that include recruitment strategies, upskilling programs, and workforce reallocation to optimize labor efficiency. Establishing a comprehensive workforce action plan ensures that mega dam projects are adequately staffed, promoting flexibility and responsiveness to dynamic project demands. Ultimately, effective workforce planning contributes to improved project outcomes by minimizing delays, reducing costs, and ensuring the successful implementation of Kenya's mega dam initiatives (Jooss et al., 2024). However, despite this strong connection between project planning strategies and project performance, studies on Kenya's mega dam projects are scarce. Despite these dams indicating that inadequate project planning and analysis can lead to project failure, there is a lack of research specifically focusing on workforce planning practices in mega dam projects. Thus, the main study was to determine the effect of workforce planning practice on performance of mega dam projects in Kenya.

2. Theoretical Review

The Theory of Change (ToC), developed by Carol Weiss in the late 1990s, provides a structured framework for evaluating complex programs by linking activities, outcomes, and long-term impacts (Weiss, 1995). It serves as a roadmap for achieving specific goals by outlining the necessary steps to bridge the gap between current conditions and desired changes (Clark, 2019). In workforce planning, ToC helps align human resources with organizational goals, ensuring that workforce needs are systematically analyzed, talent is forecasted effectively, and strategic objectives are met (Walker & Matarese, 2011; Ployhart & Morris, 2024). By applying ToC principles, organizations can enhance employee performance, job satisfaction, and operational efficiency through targeted workforce strategies (Kiettikunwong & Narot, 2024; Priyantoro, 2022).

Studies highlight the relevance of ToC in workforce planning, showing that organizations integrating this framework achieve better alignment of human resources with strategic objectives, leading to improved performance and talent retention (Hong et al., 2018; Adedeji et al., 2022). In the context of mega dam projects in Kenya, effective workforce planning based on ToC principles ensures that the right personnel with the necessary skills are available at the right time, minimizing project delays and inefficiencies. Research indicates that structured workforce planning frameworks contribute to higher project completion rates and improved quality, which is crucial for the success of large-scale infrastructure projects like mega dams (Sarihi, 2020).

3. Empirical Review (Hypothesis Development)

Workforce planning practice is a crucial component in optimizing human resource allocation, ensuring organizations maintain a balanced workforce while avoiding shortages or surpluses. Adam (2024) defines workforce planning as a continuous and systematic approach to achieving the optimum use of an organization's employees. This practice ensures that positions within an organization are effectively filled with quality personnel, as highlighted by Kilbride (2023). The significance of workforce planning extends beyond staffing; it also enhances an organization's ability to anticipate income fluctuations, future recruitment needs, and adaptability to changing business environments. Effective workforce planning plays a pivotal role in ensuring long-term organizational sustainability and growth.

Empirical studies support the role of workforce planning in enhancing organizational performance. Gomathy et al. (2022) emphasize that workforce planning is a fundamental management function that aligns workforce requirements with organizational goals under evolving conditions. Their findings indicate that superior workforce planning directly correlates with increased productivity in the private sector. Similarly, Armstrong and Murlis (2019), utilizing a descriptive research design, discovered that workforce planning strategies—when integrated with reward systems—enhance organizational performance. However, their findings contrast with Bratton and Gold (2017), who argue that motivation through compensation systems may independently boost productivity without necessarily integrating workforce planning strategies.

Further, research by Werner and De Simone (2019) highlights the aD how changes in business strategies impact human resource needs. This aligns with Nedzelsky (2016), who demonstrated

that optimal human resource allocation reduces inefficiencies, prevents cost overruns, and enhances project expenditure efficiency. Hamza et al. (2022), in their study of labor productivity in construction projects in Japan, found a positive correlation between workforce planning and project performance, suggesting that effective human resource management significantly contributes to project success.

Several studies have also examined workforce planning in the construction and water sectors. Rodjam et al. (2020) found that workforce management practices in China's construction industry improve employee performance, job satisfaction, and organizational commitment. Similarly, Raja and Murali (2020) emphasized the importance of workforce planning in human resource optimization within Indian construction projects, though their study primarily treated it as a sub-theme rather than assessing its direct impact on project efficiency. Pamela et al. (2017) further established that human resource planning significantly influences the performance of oil and gas enterprises in Nigeria, with organizational structure acting as a moderating variable.

Onziru (2021) investigated human resource planning practices in World Bank-funded water projects in Karamoja, Uganda. The findings demonstrated a significant positive effect of workforce planning on project performance, reinforcing the argument that structured workforce planning enhances project efficiency. Given the empirical evidence, workforce planning is expected to have a significant impact on the performance of mega dam projects in Kenya. Therefore, the following hypothesis is formulated:

H1: Workforce planning practice has significant effect on the performance of mega dam projects in Kenya.

4. Research Methodology

Sampling and data collection

The unit of analysis was registered civil engineers and land surveyors in Kenya while the unit of observation was the mega dam projects in Kenya that were initiated in 2013 to the time of the study. There are 25 mega dam projects initiated from the year 2013 to January 2023. For the purposes of key informant interviews, the secondary study population were senior management staff per project as they have governance mandate in the projects whereas the primary target included a total of 322 registered civil engineers and land surveyors in Kenya; Venas news 2019, www.lsb.or.ke 2018; 30% of the target population was used to arrive at a sample of 97 respondents, (Mchopa, 2021). This study employed stratified random sampling to select study sample. In this study, primary data was collected using a semi structured questionnaire because they are cost effective and convenient to collect and summarise responses (Dalati & Marx Gómez, 2018). Samples of questionnaire were administered or pilot tested to 10 respondents in Siyoi Muruny and Kasess Dams in West Pokot County.

Data analysis

The collected qualitative data was coded, and themes or concepts were noted once saturation was achieved. Quantitative data was analyzed using descriptive statistics, including frequency, percentages, and means. Summary graphs, pie charts, and frequency distribution tables were employed to illustrate the categorized data. Inferential statistics were conducted using correlation analysis. Additionally, linear regression analysis was utilized to predict the

dependent variable based on the independent variables in this investigation. The following multiple linear regression model is applicable:

$$Y = \beta_0 + \beta_1 x_1 + \varepsilon_2$$

Where; Y Represents Performance of dam projects, β_0, $\beta_{1=}$ Regression coefficient to be estimated, X_1 Represents Workforce Management Planning practice, Ɛ Represents Error term

5. Findings And Discussions

The study distributed 97 questionnaires to the respondents by the researcher assisted by 2 research assistants during data collection process and 90 were fully filled and returned to the researcher for analysis purposes. Thus, the response rate of was 93%. Sekaran & Bougie (2016), argues that a response rate of 50 percent is considered adequate, 60 percent good and above 70 percent very good.

Descriptive Statistic Results

This section provides descriptive statistic results for the study variables. The findings in Table 1 indicate that workforce planning practices play a crucial role in the performance of mega dam projects in Kenya. The high mean scores for statements such as the presence of clear organizational plans (M = 4.24, SD = 0.85), workforce inventory (M = 4.36, SD = 0.59), and an established action plan (M = 4.32, SD = 0.75) suggest that most respondents agree that these workforce planning elements are well-implemented within their organizations. Additionally, the overall workforce planning practice score (M = 4.04, SD = 0.60) reflects a generally positive perception of its role in project execution. However, the notably low mean score for the statement on matching supply and demand needs in dam construction implementation (M = 2.37, SD = 1.21) highlights a significant gap in workforce alignment with project demands. The high standard deviation (SD = 1.21) further suggests considerable variation in respondents' views, indicating inconsistencies in workforce supply-demand matching across different projects. These results emphasize that while organizations recognize the importance of workforce planning, there are challenges in ensuring its practical application, particularly in aligning workforce supply with project implementation needs. Addressing these gaps through improved forecasting and better synchronization of labor supply with project timelines could enhance the overall performance of mega dam projects in Kenya.

Table 1: Descriptive Statistic for Workforce Planning Practice

	Mean	Std. Dev
There is an elaborate organization plans and the firm's objectives are set and are clear and known to all.	4.24	0.85
There exists a Workforce inventory in the organization known to management.	4.36	0.59
All future supply and demands are well known to the clients, management and employees.	4.23	0.79
Implementation of the dam construction is based on the matching of the supply and demand needs.	2.37	1.21
There is an established action plan of the organization	4.32	0.75
Workforce planning practice	**4.04**	**0.60**

The descriptive statistics in Table 2 provide insights into the performance of mega dam projects in Kenya based on key project success indicators. The mean scores range from 3.47 to 3.80, indicating moderate agreement among respondents on various aspects of project performance. The highest mean score (M = 3.80, SD = 1.02) suggests that safety measures and defect management are relatively well-implemented in dam construction projects. However, other critical factors, such as adherence to agreed costs (M = 3.47, SD = 1.10), completion within the stipulated time (M = 3.54, SD = 1.09), and client satisfaction (M = 3.50, SD = 1.13), received slightly lower ratings, indicating some inconsistencies in project execution. The standard deviations, which range from 1.02 to 1.13, suggest a moderate variation in responses, implying that while some projects perform well in these areas, others may struggle with cost overruns, delays, and beneficiary satisfaction. These findings highlight the need for improved project planning, cost control, and stakeholder engagement to enhance the overall success of dam projects in Kenya.

Table 3: Descriptive Statistics on Performance of Dam Projects

	Mean	Std. Dev
The dam is constructed based on the agreed cost by all the stakeholders.	3.47	1.10
The dam project was constructed on the agreed upon time.	3.54	1.09
Any defects on dam construction projects are put to light and safety measures adhered to.	3.80	1.02
The dam is constructed based on the client's satisfaction	3.50	1.13
The constructed dam is productive to the target beneficiaries.	3.47	1.10
Mega dam projects performance	4.09	0.61

Correlation Analysis Results

This section provides findings on the correlation between workforce planning practice and performance of mega dam projects. The correlation analysis was used to show the relationship between variables in terms of strength and direction. The findings in Table 3 indicate that workforce planning practice, (r =.771, p value = .001<0.05), had a strong positive and significant correlation with performance of mega dam projects. This implies that advancement in workforce planning practices is significantly correlated with an increase in performance of mega dam projects.

Table 2: Correlation Analysis

		Mega dam projects performance	Workforce planning practice
Mega dam projects performance	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	90	
Workforce planning practice	Pearson Correlation	.771**	1
	Sig. (2-tailed)	0.000	
	N	90	90

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

Regression Analysis

The findings from the regression analysis in Table 3 indicate that workforce planning practice plays a significant role in determining the performance of mega dam projects in Kenya. The coefficient of determination (R^2 = 0.594) suggests that workforce planning explains approximately 59.4% of the total variations in project performance. This implies that nearly 60% of the improvements or declines in mega dam project performance can be attributed to workforce planning practices, while the remaining 40.6% may be due to other factors not accounted for in the model. The adjusted R^2 (0.589) further confirms that the model maintains its explanatory power even when adjusted for the number of predictors included. The ANOVA results provide further support for the model's validity. The F-statistic value of 128.653 and its corresponding p-value of 0.000 indicate that the regression model is statistically significant ($p < 0.05$). This means that workforce planning has a meaningful impact on project performance and that the observed relationships in the sample data are unlikely to have occurred by chance. Therefore, workforce planning practice is a crucial predictor of the performance of mega dam projects.

The regression coefficient for workforce planning ($\beta = 0.784$, $p < 0.000$) suggests a strong positive relationship between workforce planning and project performance. This means that for every unit increase in workforce planning effectiveness, the performance of mega dam projects is expected to increase by 0.784 units, holding other factors constant. The constant term (0.928) in the regression model represents the baseline performance of mega dam projects when workforce planning is absent. These findings align with existing literature on workforce planning and its impact on organizational performance. Studies such as those by Gomathy et al. (2022) and Armstrong & Murlis (2019) highlight the critical role of workforce planning in enhancing productivity and aligning human resource allocation with organizational objectives. Additionally, Werner & De Simone (2019) emphasize the forecasting capabilities of workforce planning, which allow organizations to anticipate future staffing needs and adapt to changing conditions. In the construction sector, Hamza et al. (2022) and Onziru (2021) found that workforce planning significantly improves project efficiency and cost management, reinforcing its importance in large-scale infrastructure projects such as mega dams.

Table 3 Regression Analysis

	Unstandardized Coefficients		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	Sig.
(Constant)	0.928	0.282		3.292	0.001
Workforce planning practice	0.784	0.069	0.771	11.343	0.000
Model Summary Statistics					
R	.771				
R Square	0.594				
Adjusted R Square	0.589				
ANOVA					
F	128.653				
Sig.	.000				

a Dependent Variable: mega dam projects performance

6. Conclusions and Recommendations

The results confirm that workforce planning is a key determinant of the successful execution of mega dam projects in Kenya. Organizations that invest in structured workforce planning strategies can enhance project efficiency, minimize delays, and optimize resource allocation. Given the strong empirical support from previous studies, workforce planning should be prioritized in project management frameworks to improve the sustainability and performance of infrastructure projects.

To enhance workforce planning and improve the performance of mega dam projects in Kenya, organizations should develop comprehensive workforce strategies aligned with project timelines, invest in continuous training programs to enhance employee skills, and adopt technology-driven workforce management tools for accurate labor forecasting. Strengthening HR policies, ensuring compliance, and fostering collaboration with government agencies and industry stakeholders will help address labor shortages and align workforce planning with regulatory requirements. Regular performance reviews should be conducted to identify gaps and implement necessary adjustments, while flexible and adaptive workforce strategies should be adopted to accommodate evolving project needs. These measures will optimize human resource allocation, enhance productivity, and contribute to the successful execution of mega dam projects.

7. Areas for Further Research

Despite providing crucial empirical evidence on the influence of workforce planning practices on the performance of mega dam projects in Kenya, this study had certain limitations. It focused solely on workforce planning as a single aspect of project planning, without considering other critical project management practices. Future researchers could expand the scope by incorporating project planning practices, project risk management, project scope management, and evaluation controls to provide a more comprehensive understanding. Additionally, this study was limited to mega dam construction projects in Kenya, and future studies could extend the analysis to other large-scale infrastructure projects, such as roads, bridges, and energy developments, to enhance generalizability.

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