ORIGINAL RESEARCH ARTICLE

Project procurement process and performance of major dam projects in Kenya

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ABSTRACT

Effective major dam project procurement process in sourcing for quality construction materials and qualified professionals has huge positive effect on performance of major dams. In Kenya however, situation analysis reports on some major dam projects revealed low and questionable performance. The aim of this study was to examine the effect of project procurement process on performance of major dam projects in Kenya. The study utilized descriptive research design, with a sample size of 221 respondents comprising officials from ministries of water sanitation and irrigation and other government departments, water service organizations, donors and local persons directly affected by dam construction projects. Respondents were selected through stratified sampling, and primary data collected using a questionnaire. Content and construct validity was used to test the data collection tool, while Cronbach's alpha coefficient was used for assessment of instrument's reliability. The data was analysed using IBM SPPS Version 24, while descriptive statistical analysis was used to summarize data through frequency, percentage, mean and standard deviation. Inferential statistics was used to ascertain the relationship between the variables. Both descriptive and linear regression analysis results showed that project procurement process has significant positive influence on performance of major dam projects in Kenya. The study concluded that transparent project procurement approaches like clear competitive bidding and effective contract management methods can significantly influence performance of major dam projects in Kenya. The study recommended that relevant dam project management authorities ensure that the entire procurement process for supply of quality goods and services and cost controls is effective and above board, and the risks well managed. Additionally, an environment effective collaboration between project team members and suppliers should always be in place.

Key words: Project procurement, Performance of major dams, sustainable value management

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1.0 Introduction and Literature Review

Project procurement process is a significant determinant of performance of major dam projects. To lessen procurement process-related problems, it is crucial to ensure a transparent, competitive and well-regulated procurement process that prioritizes the selection of qualified and experienced contractors. Additionally, regular monitoring and oversight should be carried out to ensure that the contractors adhere to quality standards throughout the project's lifecycle (World Bank, 2020). The quality of major dam projects in Kenya has been compromised by project procurement shortfalls, lack of transparency during competitive bidding, inadequate evaluation of contractor qualifications and insufficient oversight and monitoring of the procurement process (World Bank, 2020). OECD (2020) reported that waste and fraud in procurement processes remains a major hindrance to successful completion and quality of many dam construction projects in the pacific, Asian and African countries. Water utility firms, water management boards, river basin organizations and respective national governments often show laxity in judgment when making decisions on bids for large contracts, resulting in questionable procurement processes.

According to World Bank (2020), ability to protect public interest in water sector development relies on commitment, skills and integrity of procurement officers. Procurement concerns in this regard have been heightened by new era large-scale construction of dams for irrigation, piped water and wastewater and sewerage treatment. This is because poor procurement process often leads to selection of ineffective contractors and eventually compromises the quality of the constructed dam. World Bank enterprise surveys on open contracting partnership estimate that governments around the world sign high profile contracts worth millions of dollars every year, yet detailed information on final awarded construction contracts often remains unavailable for public scrutiny. This exposes the procurement processes to corruption and gross mismanagement. The World Bank enterprise survey on corruption also showed that more than 23 per cent of construction companies awarded dam construction contracts in East Asia, South Asia, and Africa had issued bribes to win their respective bids. This often affects value management and eventually compromises construction quality.

In Kenya, situation analysis reports have revealed low performance of major dam projects, with farmers and project affected persons bearing the burden of poor dam constructions ripple effects (World Bank, 2019). Project procurement-related challenges have been and still continue to compromise the quality of dam projects, leading to devastating effects to local fauna and flora; persons living around the dams get their socioeconomic lives affected, they are exposed to mosquitos, crocodiles and other wild animals that come to take water at the dams. In addition dam displaced persons are normally left to go look for alterative land elsewhere which results in breaking the family social integration. Those who don't manage to buy land end up being landless after squandering their compensation money. A report by the Kenya Human Rights Commission (2018) on the Solai Dam tragedy, which left 48 people dead, noted that at least 5000 victims were displaced and property worth hundreds of thousands of shillings destroyed. Importantly, the report underlined the existence of the Prevention, Protection and Assistance to Internally Displaced Persons and Affected Communities Act (No. 56 of 2018)

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popularly known as the IDP Act, which makes provisions for the protection and assistance to internally displaced persons and affected communities. The report also noted that the Parliamentary Senate Committee on Security, Defence and Foreign Relations undertook a fact-finding mission and recommended that the owners of poor quality dams should be held culpable and that the Water Resources Management Authority should be disbanded for negligence if could not effectively execute its regulatory functions. In a nutshell, dam construction quality can be achieved through effective project procurement process like thorough supplier evaluation, clear defined quality assurance, controls and standards, supplier performance monitoring, collaborations with suppliers (IWMI, 2018).

The objective of this study was to examine the effect of project procurement process on performance of major dam projects in Kenya. The study adopted procurement process as a proposed sustainable value management dimension that influences construction quality of major dam projects.

2.0 Materials and Methods

The study utilized descriptive research design which is a method of collecting data at one point in time by interviewing and administering a questionnaire to a sample of respondents. This approach was suitable because it allowed an in-depth analysis of the events or phenomenon under focus, as outlined by Orodho (2018). The population of the study was 494 individuals who were split into groups (strata) comprising top management team from Ministry of Water, Sanitation and Irrigation, the National Treasury, African Development Bank, World Bank and senior management officers from relevant regulatory and Water provision authorities, community leaders, and project affected persons living around 24 dams which were under planning, construction or complete. The sample size of 221 respondents was determined using Taro Yamane (1967) proportional sampling technique formula, as illustrated in Table 1. Stratified sampling technique, which ensures that the selected group contains elements representative of the characteristics found in the sampling frame (Kothari, 2017), was used in the study. Respondents from each stratum were selected through simple random sampling.

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Table 1 sample Size

Category of Respondent	No.of Officers (N)	Sample n= (N/Target Pop.) x Sample Size
Water Secretary (Technical)	1	1
Irrigation Secretary (Technical)	1	1
Directors from Water Services Regulatory Board (1x4) (Technical)	4	2
Senior Managers from Water Works Development Agencies (3x9) (Technical)	27	12
Top Managers of Water Resources Authority (Technical)	3	2
Dam Construction Contractors/Project Managers (Technical)	10	4
Consulting and Site Engineers (2x10) (Technical)	20	9
Ministry of water Project Coordinators (Technical)	10	4
Construction Firms Engineers/Technical Personnel (Technical)	10	4
NEMA Officials(Technical)	5	2
Project Affected Persons (10x24) (non-Technical)	240	107
Area Members of County Assembly-MCAs (3x24) (non-Technical)	72	32
Water Administrators (3x24) (non-Technical)	72	32
Donor Agencies (African Development Bank, World Bank, JICA) (non-Technical)	3	2
The National Treasury- Project Coordinators (non-Technical)	2	1
Water Service Providers(non-Technical)	14	6

Source; Ministry of Water, Sanitation and Irrigation, 2021

Primary data was collected using questionnaires, as this approach provides a relatively cheap, quick, and efficient way of obtaining large amounts of information from a large sample of people (Cooper & Schindler, 2018). The questionnaire featured questions set in Likert scale format, with 1 representing (strongly disagree), 2 (disagree), 3(more or less disagree), 4(undecided) 5(more or less agree) 6 (agree) and 7 (strongly agree). Content plus construct validity was used for assessing the data collection instrument for clarity of words, because it is considered more scientific approach than mere content or face validity. Reliability of the research instrument was tested using Cronbach's alpha-a test of internal consistency (Kothari, 2017) where the six items had a Cronbach's alpha coefficient of 0.813 confirming reliability because it is above the threshold of 0.7. The data was analyzed using IBM SPPS Version 24. Descriptive statistical analysis was used to summarize data using frequencies, percentages means and standard deviations while inferential statistics was computed to determine variable relationship.

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3.0 Results and discussion

Out of the 221 questionnaires administered among the respondents, 203 questionnaires were returned completely filled, representing a response rate of 91.85%.

3.1 Descriptive Statistics

This are results of measures of central tendency and dispersion on whether project procurement process has a bearing on the performance of major dam construction projects in Kenya, are represented in Table 2.

Table 2 Measures of central tendency on effect of project procurement process on performance of dam construction projects

	7	6	5	4	3	2	1	Median	Mode	Mean
There is competitive bidding process that guides contractor selection	19	29	47	46	33	20	9	4.00	5	4.31
Contract management process affects quality of constructed dams	29	39	34	33	28	25	15	5.00	6	4.37
The tendering process has timeliness to speed up procurement process	36	42	38	26	30	17	14	5.00	6	4.63
Tendering process costs and associated expenses have an impact on dam contractor selection	35	38	52	21	27	20	10	5.00	5	4.67
The type of procurement system used affects timeliness of the procurement process	31	40	42	27	29	18	16	5.00	5	4.52
Resource and technical capacity of selected contractors affect quality of constructed dam project	34	37	43	28	28	18	15	5.00	5	4.54
Grand Mean of Responses = 4.507										
Valid N (listwise) 203										

From the table, most respondents, 47 in total, more or less agreed that there was competitive bidding process that guides contractor selection, while 33 and 20 respondents more less disagreed and disagreed respectively to the statement, implying that there are indeed cases of non-competitive bidding processes, which could lead to selection of incompetent contractors, resulting in construction of poor quality dams. This is reinforced by most respondents who more or less greed (43), agreed (37) and strongly agreed (34) respectively that resource and technical capacity of selected contractors affect quality of constructed dam project. This is supported by Bailey et.al (2017), whose studies on procurement process in major dam constructions in the UK found that the use of sample specifications during the procurement process was effective in curbing rogue contractors and wrong deliveries of complex construction materials that can thus negatively affect performance of major dams.

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The grand mean was 4.507 which when rounded off to the nearest number is 5, which is 'more or less agree' on the Likert scale of measurement used in the study, implying that most respondents more or less agreed that project procurement process (in terms of bidding/tendering, type of procurement system used and contract management issues) if compromised will have influence on the quality of major dam construction projects in Kenya.
Table 3 provides a summarized measure of dispersion for data obtained in the study. From the table, the range is 6, minimum value is 1, and maximum value 7, as per the 7-point Likert scale used to measure question items on project procurement variable. All standard deviation values are more than 1 value but less than 2, implying that this dataset on project procurement variable assumes normal distribution, since all of the values are within one standard deviation on either side of the mean- thus showing normal small spread and variance. Most values on skewness are negative (-ve) meaning the left tail is longer but normally peaked- Mesokurtic (normal curve) and kurtosis values are not extreme implying normal distribution of responses on project procurement variable.

Table 3 Measures of dispersion for data obtained on project procurement

	N	Range	Min	Max	Mean	Std. Dev.	Variance	Skewness	Kurtosis
There is competitive bidding process that guides contractor selection	203	6	1	7	4.31	1.587	2.520	-.145	-.646
Contract management process affects quality of constructed dams	203	6	1	7	4.37	1.842	3.394	-.228	-.955
The tendering process has timeliness to speed up procurement process	203	6	1	7	4.63	1.826	3.333	-.416	-.887
Tendering process costs and associated expenses have an impact on dam contractor selection	203	6	1	7	4.67	1.759	3.093	-.435	-.809
The type of procurement system used affects timeliness of the procurement process	203	6	1	7	4.52	1.822	3.320	-.388	-.882
Resource and technical capacity of selected contractors affect quality of constructed dam project	203	6	1	7	4.54	1.824	3.329	-.367	-.890

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3.2 Linear Regression Analysis

Table 4 represents inferential statistics computed to show the linear influence of project procurement on the performance of major dam projects in Kenya. It worth noting that since collected data was categorical in nature, it was transformed to continuous data so as to allow running of linear regression analysis that perfectly rely on continuous data to yield logical statistical inferences. From table 4, the model shows an adjusted R^2 of 0.797 showing corrected goodness of fit and we can confidently infer that the study model explains 79.7% of the variations in the performance of major dam projects in Kenya while other factors not in this study model accounts for 20.3%, thus, it is a good study model.

The adjusted R^2 is sometimes normally used by statisticians because it is a corrected goodness of fit (model accuracy) measure of linear models than just relying on R^2 which is just a statistical measure that represents the proportion of the variance of the dependent variable that is explained by independent variable in a regression model (Hair et al, 2018).

Table 4 Linear Regression Analysis of data on project procurement

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.893[a]	.798	.797	.73634	.798	792.002	1	201	.000

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	429.419	1	429.419	792.002	.000[b]
	Residual	108.981	201	.542		
	Total	538.401	202			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.439	.079		5.545	.000
	Project Procurement	.787	.070	.893	7.437	.000

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From ANOVA results, F-statistic is 792.002, significant at p≤0.05confirms the model is good fit for data and that the independent variable (project procurement), is a significantly useful predictor of the dependent variable (performance of major dam projects in Kenya).

The linear regression results showed that project procurement process has positive significant influence on performance of major dam projects in Kenya (β = 0. 787 (0.070) at p<0.05). The results indicate that a single increase in effective project procurement approaches by relevant top management authorities will lead to 0.787 unit increase in the performance of major dam projects in Kenya. The linear regression results are supported Lysons and Farrington (2017) study on procurement materials for construction of dams in Zimbabwe, which found that when goods delivered do not match the purchase order, consequently affects quality of construction. Lopez (2018), study on construction of dam projects in Ethiopia also found that poor construction materials affected construction quality and recommended that during the procurement process, practicing procurement professionals should use brand or trade name specifications for construction materials that rely on brand names known for their proven quality standards.

4.0 Summary of Findings

First, from descriptive statistics, most respondents agreed that project procurement process (in terms of bidding/tendering, type of procurement system used and contract management issues) have an influence on the quality of major dam construction projects in Kenya.

Secondly, the linear regression results showed that project procurement process has positive significant influence on performance of major dam projects in Kenya, indicating that a single increase in effective project procurement approaches by relevant top management authorities will lead to significant increase in the performance of major dam projects in Kenya.

5.0 Conclusion

From study findings, it can be concluded that project procurement attributes such as bidding/tendering, type of procurement system used and contract management issues have significant influence on the performance of major dam construction projects in Kenya.

6.0 Recommendations

From study findings, it can be recommended that relevant dam project management authorities should have a centralized data solution that can help in analytics, planning, macro-scale decisions and ensure smooth workflows at all stages of procurement to ensure that there is clean transparent and open competitive bidding for supply of quality goods and services, Proper management of cost controls and risks, and promotion of effective collaboration between project teams and suppliers.

7.0 Acknowledgement

7.1 Funding

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7.2 General acknowledgement
None.

7.3 Conflict of interest
None.

7.4 Ethical Considerations
First, the researcher drafted research participation consent letters to allow sampled respondents voluntarily participate in the study with informed consent. Secondly, the researcher had research authorization letters from the university and National Commission for Science, Technology and Innovation (NACOSTI) that gave authority to the researcher to carry out the research in the 24 selected dams in Kenya.

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