ORIGINAL RESEARCH ARTICLE

Effect of community participation on performance of major dam projects in Kenya

Monyenye, Vincent O.[1], Lango Benard[2], Miroga Julius[2], Cheruiyot Charles K.[1]
[1]Department of Civil Engineering, Jomo Kenyatta University of Agriculture and Technology (JKUAT), Nairobi, Kenya
[2]School of Human resource and development, Jomo Kenyatta University of Agriculture and Technology (JKUAT), Nairobi, Kenya
[3]Department of Commerce and Economic Studies, Jomo Kenyatta University of Agriculture and Technology (JKUAT), Nairobi, Kenya

Corresponding author email: vincentomonyenye@hotmail.com

ABSTRACT
Globally, major dam projects are intended to offer significant benefits to the local communities where they are constructed. Evaluations over the years have shown that in the development of major dam projects, it is essential to consider potential social and environmental impacts, such as displacement of communities, alteration of ecosystems, and potential conflicts over water resources. The aim of this study was to establish the effect of community participation on the performance of major dam projects in Kenya. Using a sample size of 221 respondents comprising officials from government ministries and statutory bodies, water service providers, consultant engineers, representatives from donor agencies, and persons living around ongoing dam projects, the study employed questionnaires to collect primary data. Descriptive statistics were used to summarise data through frequency, percentage, mean, and standard deviation, while inferential statistics were computed to determine relationships between the variables. From the descriptive statistics, there was an equal split between those who agreed and those who did not agree that local community members were involved in major dam construction projects. From interviews, on the other hand, most respondents argued that there was no inclusivity and informed consent in project needs assessment, project negotiations, and compensation agreements since the local political leaders hijacked the process for their own selfish ends. The study showed that community participation has a significant positive influence on the performance of major dam projects in Kenya and concluded that the inclusion of objective key stakeholders and representatives of local community members in all phases of dam construction projects could significantly enhance the performance of the projects in the country. The study thus recommends that objective key stakeholders and representatives of the local community be allowed to participate in all phases of dam construction projects so as to enable locals to collectively own and appreciate the social-economic values of dam projects in their locality.

Keywords: Dam projects, community participation, Kenya, social-economic impact, stakeholder engagement

1.0 Introduction

Major dam projects in developing countries have several important benefits, such as sustainable water management, hydropower generation, flood control, and environmental conservation. While this is the case, it is essential to take into account the potential social and environmental impacts of the projects, such as displacement of communities, alteration of ecosystems, and conflicts over water resources (Ostrom, 2018; OECD, 2020). Proper planning, consultation, and environmental impact assessments are crucial to ensuring that the projects are beneficial to communities within their locality. Arku (2019) recommended the need for community participation in community water-related projects. The NGO Management School Switzerland (2019) asserted that participatory development is the most important approach towards enabling communities to help themselves and sustain efforts in development work. In this approach, communities are not only seen as recipients of development programmes but also as critical stakeholders who have an important role to play in the management of the projects (Diy, 2020). Community stakeholders can influence sustainable value management of dam projects within their jurisdiction through participation from the community governing council, civil society groups, community associations, youth leadership, and project affected persons, in addition to influencing leadership opinion (Diy, 2020).

Empirical studies on the role of community participation in the performance of major dam projects around the globe, and particularly in Kenya, are limited. In a study on open perspectives on the readiness of river basin management plans in the Herault watershed dams in southern France, Garin et al. (2018) compared the perspectives of different partners against those of specialists. The research found that specific private concerns are hardly appreciated by specialists, while on the other hand, the general public remains largely blind to a number of issues considered important by the specialists. Specialists and partners hold different opinions on the nature or cause of the issues and the relevant remedial measures that should be taken to address them. These differences can prompt resistance to the project plans from the local community members, leading to bottlenecks in execution.

Beierle and Konisky (2019) looked into the need for community participation, especially in critical decision-making during project implementation stages. The examination depended on an assessment of instances of open support in dam development in the Great Lakes locale in North America. The study established that in 58% of selected case studies, disagreements between the various parties were significantly reduced. They additionally found that the communication procedure, accord-building, and jurisprudence employed played a big role in determining the efficiency of conflict resolution.

In Kenya, Mulwa (2018) established that most project failures originated from attempts to impose standard top-down programmes and projects on diverse local realities where they neither fit nor answer the needs of the local people. This top-down approach rode on the notion that locals were ignorant and too primitive to effectively discern and decide what was good and appropriate for them and, as such, were not expected to set up their own development priorities, rank them, and identify the most felt needs. Thanks to the top-down approach, sustainability, a key component for ensuring

community ownership of projects, continued to be sidelined as development specialists kept doing what they felt was good for the people without actually consulting them. The approach was responsible for the collapse of most community development projects, such as dams, bridges, schools, and even health facilities. Community participation in development projects is meant to correct the inadequacies of the top-down approach to community development (Mulwa, 2018).

In project reports for most major dam projects in Kenya, such as Ndakaini and Thwake, among others, there are recommendations to the effect that there should be enhanced community participation and advocacy in matters concerning the value of the projects to local communities, so that all community members are given an equal chance to raise opinions during decision-making at all project life cycles through appropriate civil institutions representing their interests. In many instances, community members have suffered downstream ripple effects from major dams, leading them to question the real value of such projects to their lives and biodiversity (Kenya Human Rights Commission, 2018). The objective of the study was to establish the effect of community participation on the performance of major dam projects in Kenya. Community participation (measured in terms of public participation, resource mobilisation, and capacity building) was the independent variable of the study, while the performance of major dam projects in Kenya (client satisfaction, dam safety and durability, value for money, and quality standards) was the dependent variable.

2.0 Materials and methods

The study utilised a 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 for the study because it allowed an in-depth analysis of the events or phenomenon under focus, as recommended by Orodho (2018). The study population was 494 persons, comprising a top management team from the Ministry of Water, Sanitation, and Irrigation, the National Treasury, the African Development Bank, the World Bank, senior management officers from relevant regulatory and water provision authorities, community leaders, and project-affected persons living around 24 dams that were under planning, under construction, and complete, as outlined in Table 1. A sample size of 221 respondents was determined using the Taro Yamane (2019) proportional sampling technique formula.

$$n = N / (1 + N(e)^2),$$

Where n signifies the sample size, N the population under study, and e the margin error

Table 1 Sample Size

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

The study utilized Stratified random sampling a method of sampling that involves the division of a population into smaller subgroups known as strata. In stratified random sampling, or stratification, the strata are formed based on members' shared attributes or characteristics, such as income , levels of interests or educational attainment, stratified sampling technique, which involved proportionate selection of participants from each of the 16 category of respondents listed in the table. This approach ensured that each category was represented and therefore the sample provided a proper representation of the population, as recommend by Kothari (2019).

Primary data was collected using a questionnaire with open and close-ended questions. The questionnaire provides a relatively cheap, quick and efficient way of obtaining large amounts of information from a large sample (Cooper and Schindler, 2018). A 7-point Likert scale was employed in the questionnaire, 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). This scale was preferred because it allows for a greater range of responses, providing respondents with more options to express their opinions or attitudes. Validity of data collection instruments was assessed using content plus construct validity because the approach is considered more scientific than content or face validity.

Reliability of the research instrument was tested using Cronbach's alpha-a test of internal consistency, as recommended by Kothari (2019).

Collected data was edited, cleaned and coded, and then IBM SPPS Version 24 used to analyze the data. Descriptive statistical analysis was used to summarize data in terms of frequency, percentage, mean and standard deviation, while inferential statistics was computed to determine relationship between the variables.

3.0 Results and discussion
A total of 221 questionnaires were administered to the respondents of the study, as outlined in Table 1. Out of these, 203 questionnaires were returned completely filled, depicting a response rate of 91.85%. This is well above the minimum of 50% recommended for a good response rate according to Cleave (2020).

3.1 Descriptive statistics
Table 2 shows the results of measures of central tendency on the question of impact of community participation on performance of major dam construction projects in Kenya.

Table 2: Community participation descriptive statistical findings

	7	6	5	4	3	2	1	Median	Mode	Mean
Effective public publication measures affect timely completion and quality of dam construction projects	32	45	41	19	36	16	14	5.00	6	4.55
Project ownership issue are normally addressed at the project planning and implementation phases	29	34	30	28	37	25	20	4.00	3	4.19
Capacity building issues really affect timely completion and quality of dam construction projects	31	40	43	18	26	24	21	5.00	5	4.42
There is responsive collaboration with community members and leaders in project planning and implementation stage	31	25	30	30	27	34	26	4.00	2	4.00
There are well stipulated community compensation schemes to address compensation complaints	27	31	28	18	39	33	27	4.00	3	3.93
There are resource mobilization activities to support dam construction projects	28	36	27	31	33	32	16	4.00	6	4.19
Participatory involvement of local legislative leaders influence possession of dam construction sites and commencement of works	34	36	30	25	36	27	15	4.00	6	4.36

Grand mean of responses = 4.234
Valid N (list-wise): 203

The table indicates that while most respondents more or less agreed (41) and agreed (45) that effective public publication measures affect timely completion and quality of dam construction projects, a significant number more or less disagreed(37), disagreed (25) and strongly disagreed (20) that project ownership issues are normally addressed at the project planning and implementation

phases. More so, while most respondents more or less agreed (43) and agreed (40) that capacity building issues affect timely completion and quality of dam construction projects, in practice, most respondents disagreed (34) and strongly disagreed (26) that there is responsive collaboration with community members and leaders in project planning and implementation stage, and a further majority of respondents more or less disagreed (39) and disagreed (33) that there are well stipulated community compensation schemes to address compensation complaints.

The grand mean of responses is 4.234, implying divided opinion on the perceived influence of community participation on the performance of major dam projects in Kenya. Thus, while a significant number of respondents agreed that local community members were involved in the projects, an almost similar number gave responses that indicated possible lack of involvement in the dam construction projects within their localities. This is supported by Ostrom (2018) assertion that given the degree of vulnerability that water assets manager's face, numerous activities are chosen without full information on their results.

3.2 Inferential statistics

Table 3 illustrates inferential statistics on the direct effect of community participation on performance of major dam projects in Kenya. Since collected data was categorical in nature, it was first transformed to continuous data so as to allow running of linear regression analysis that basically rely on continuous data so as to yield logical statistical inferences.

Table 3 Linear regression analysis

Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.842[a]	.709	.707	.88306	.709	489.443	1	201	.000

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	381.663	1	381.663	489.443	.000[b]	
	Residual	156.738	201	.780			
	Total	538.401	202				

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			
		B	Std. Error	Beta		t	Sig.
1	(Constant)	.390	.043			6.536	.000
	Community Participation	.807	.037	.842		10.338	.000

a. Dependent Variable: Performance of major dam projects in Kenya

From the table, the model shows an adjusted R^2 of 0.707, showing corrected goodness of fit and we can confidently infer that the study model explains 70.7% of the variations in the performance of

major dam projects in Kenya while other factors not in this study model accounts for 29.3%, 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, 2019).

From ANOVA results, F-statistic is 489.443 significant at p≤0.05confirms the model is good fit for data and that the independent variable (community participation), is a significant predictor of the dependent variable (performance of major dam projects in Kenya).

Linear regression results showed that community participation has positive significant influence on performance of major dam projects in Kenya (β = 0. 807 (0.037) at p<0.05). The results indicate that a single increase in effective project procurement approaches by relevant top management authorities will lead to 0.807 unit increase in the performance of major dam projects in Kenya.

The results are consistent with the Stakeholder Theory (Freedman, 2019) which asserts that there are a number of stakeholders in communities where major dam construction projects are done who should be involved in all project life cycle stages; simply because they can significantly influence the failure or success major dam construction project in Kenya. More so, the results are supported by Beierle and Konisky (2019), who explored the need for community participation especially in key decision-making at project implementation stages, and found that good public support helped in settling clashes among partners, thus contention between interests declined as it gave chance to raise own issues and resolve contrasts at every phase of the project life cycle.

Diy (2020) study also reinforced that community stakeholders can influence sustainable value management of a major dam construction project within their jurisdiction. This is reinforced by responses from interviewees in this study who argued that in some dams, construction workers were imported from outside the local community or even Kenya due to lack of technical expertise, and that threats of demonstrations and sabotage from local community members assisted them get manual and some technical jobs. The threats from some local community members/ leaders also assisted them get involved in dam construction monitoring and evaluations.

Furthermore, from interviews with respondents, first apart from community participation aspects such as pre and post construction support, public participation and or civil engagements, key stakeholder involvement, responsive collaboration, plus project ownership and compensation issues, interviewees reported that lack of information, lack of local community leadership, lack of local skilled facilitator, inadequate financial resources to facilitate community participation, previous community project experiences were among challenges affecting overall performance of the major dam projects in Kenya.

More so, some concerned community members/leaders do not participate in project identification or initiation stages and do not attend project identification meetings because of political reasons. That is, if the projects takes a political angle, most rival political groups (for and against the dam project) will fight to gain political mileage from the project, which might determine the failure or success of the dam construction project.

Further, reasons given by respondents on why they thought community participation in the dam construction project would affect its performance, included, supply of cheap but quality local materials, advising on soil topography and drainage system, weather patterns, helping to break down the cycle of dependence from external water sources, sense of contribution and control over community development assistance, thus ownership of the dam project.

From the interviews, most respondent argued that there was no inclusivity and informed consent in project needs assessment, project negotiations and compensation agreements, since the local community leaders hijacked the process for their own selfish ends and for the benefit of their family members and political backings. More so, there was inconsistent community engagement in all phases of the project life cycle simply because community representation kept on changing from each project stage. This inconsistency affects systematic monitoring and evaluation of the quality of the dam projects from the projects initiation to completion; thus raise accountability issues.

In terms of recruitment and training of local community members for job opportunities, there was divided responses because while a good number of respondents agreed that local community members were awarded job opportunities, a sizeable number of respondents argued that in some dams, construction workers were imported from outside the local community or even Kenya due to lack of technical expertise and that threats of demonstrations and sabotage from local community members assisted them get manual and some technical jobs. The threats from some local community members/ leaders also assisted them get involved in dam construction monitoring and evaluations.

3.3 Summary of findings
From descriptive statistics, a sizeable number of respondents agreed on the involvement of the local community members, and almost similar number of respondents were not of the opinion that community members were possibly not involved in the major dam construction projects around their areas.

From interviews, most respondent argued that there was no inclusivity and informed consent in project needs assessment, project negotiations and compensation agreements. More so, there was inconsistent community engagement in all phases of the project life cycle simply because community representation kept on changing from each project stage. Persons affected by the project end up not to own the project for sustainable value management. As a result, communities living around the projects do not gain socio-economic benefits, but rather get exposed to a myriad of challenges associated with the projects. The study has also shown that community participation, if well

conducted, has positive significant influence on performance of sustainable value management of major dam projects in Kenya.

4.0 Conclusion

From study findings, it can be concluded that honest and transparent inclusion of project key stakeholders and representatives of local community members in all phases of dam construction projects can significantly enhance performance of dam projects in Kenya.

5.0 Recommendations

The study recommends that project key stakeholders and representatives of local community members be allowed to participate in all phases of dam construction projects, so as to enable them collectively own and appreciate the social-economic values of the projects in their localities.

6.0 Acknowledgement

6.1 Funding

None.

6.2 General acknowledgement

None

6.3 Ethical consideration

The research was conducted in compliance with ethical standards and guidelines set forth by National Commission of Science and Technology. Clearance License number NACOSTI/P/22/18543 (Ref: 360387) was obtained.

6.4 Conflict of interest

None

7.0 References

Arku, F. (2019). Dilemma of engaging community-wide in development: Has Konko's (Eastern Region, Ghana) water and sanitation committee taken over decision making at the community's will? *Int. NGO J. 6*(9):203-210.

Beierle, T. & Konisky, D. (2019). Public Participation in Environmental Planning in the Great Lakes Region, Discussion papers, Resources for the Future, Washington.

Cleave, P. (2020). What is a good survey response rate? *Smart Survey*. https://www.smartsurvey.co.uk/blog/what-is-a-good-survey-response-rate

Cooper. D. & Schindler, P. (2018). Business research methods (12th ed). New York: McGraw Hill.

Diy, A (2020). A Guide to Engaging the Community in Your Project. Toronto: Artscape DIY.

Freeman, R., Harrison, J. & Wicks, A. (2019). Stakeholder Theory: The state of the art. Cambridge, UK: Cambridge University Press.

Freeman, R. E (2019). Strategic Management: A Stakeholder Approach. Boston: Pitman.

Garin P. & Ruhlmann, J, Ghandi, M. K.Green, C (2018). Linking expert evaluation with public consultation to design water policy at the watershed level. *Water Science and Technology, 66* (11)

Hair, J. F., Black, W.C., Babin, B.J., Anderson, & R.E., Tatham, R.L. (2019), Multivariate Data Analysis, 7th ed., Prentice-Hall, Upper Saddle River, NJ. Journal of agriculture science & technology https://ojs.jkuat.ac.ke/index.php/JAGST

Kenya Human Rights Commission (2018). The Legal Issues Arising From the Dam Tragedy. *http://www.khrc.or.ke*

Kothari, C. (2019). Research Methodology: Methods and Technology. New Delhi: India: New Age Publication.

Mulwa, F (2018). Participatory Monitoring and Evaluation of community projects. Paulines publications Africa, Nairobi Kenya.

NGO Management School Switzerland (2019). Contribution of people's participation: Evidence from 121 rural water supply projects. Washington, DC: The World Bank.

OECD (2020). Recommendation of the Council on Public Procurement. Paris: OECD.

Orodho, A. J. (2018). Essentials of educational and social science research methods. Nairobi: Masola Publishers.

Ostrom, E (2018). Governing the Commons: the Evolution of Institutions for Collective Action, Cambridge University Press, New York.

Taro Yamane (2019), Statistics: An Introductory Analysis, 3rd Edition, New York Vol. 4 No. 6, 178-184

World vision Kenya Annual (2019). https://www.wvi.org/publications/