

Effect of Contractor Capacity and Monitoring and Evaluation on Completion of Water Projects among Water Services Boards in Kenya

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Abstract – In Kenya, many water projects experience delays in completion even after substantial investments. The main objective of this study was to determine the influence of monitoring and evaluation and contractor capacity on completion of water projects among Water Services Boards in Kenya. Lake Victoria Water Services board was used as a case study. This study employed both quantitative and qualitative research and adopted descriptive research design. The target population for this study was 50 water projects all of which were studied as a census. Census technique was used to select all 200 engineers who had been previously directly involved in the construction of the respective projects to participate in the study as respondents. The main data collection instrument was a semi-structured questionnaire. A questionnaire return rate of 84% was achieved. Data analysis employed both descriptive and inferential statistics. Measures such as frequencies and percentages and Karl Pearson's correlation were computed and used to explain the relationship between the variables. Monitoring and Evaluation (M&E) factors studied included stakeholder participation and communication strategy which had a weak but significant positive relationship with project completion ($r = 0.299$, $p < 0.01$). Contractor capacity had a moderate positive relationship with project completion ($r = 0.657$, $p < 0.01$).

Keywords: contractor financial capacity, project communication, project completion time, project quality

I. INTRODUCTION

The triple constraint model of time, cost and scope with quality being the central theme is the most common criteria for defining project success [1]. These constraints need to be managed effectively. The problems of project completion are prevalent in construction industry worldwide as characterised by cost over-runs, delays and unmet customer and client requirements. Being a complex industry, with several parties

staking a claim, the achievement of project success require an optimum balance between these constraints.

There are several instances where completion of water projects have been a challenge. [2] examined 41 previous studies focusing on construction delays around the world and found that delays in completion of infrastructure development projects are prevalent worldwide in all sectors and industries. Timeliness of completion of construction projects is not only a measure of project success but it is also a matter of immense contractual significance to owner, contractor and to stakeholders in general [3]

The focus for research on project completion has evolved over time. Some studies focused on techniques by identifying either causes or effects of the delays with a view to controlling the factors that cause failure [3]. Other researchers focused on developing strategies, philosophies and methodologies of project implementation as the most important project success factors.

Unsuccessful or delayed project completion implies that target benefits of the projects are only partly or never realised at all. Delayed completion has both high costs to society and debilitating effects on the contracting parties [4]. In the particular case of water projects, delayed completion makes it difficult to achieve reasonable access to affordable, safe and adequate water supply service which not only infringes a fundamental human right but also affect national growth.

This study focused on contractors' capacity and monitoring and evaluation factors. These factors are within the control of contracting parties. The objective of the study was to investigate the effect of contractor's capacity and monitoring and evaluation (M & E) on

project completion among water projects in Kenya using Lake Victoria Water North Services Board (LVNWSB) as a case study. LVNWSB is responsible for the provision of water and sanitation services in Western and parts of Rift Valley regions of Kenya. It is hoped that the findings would help the parties involved in water service provision in Kenya to mitigate the challenges in the sector and help the country achieve Sustainable Development Goals and Vision 2030.

II. CONCEPTUAL FRAMEWORK

A conceptual framework is a representation of the dependent, independent and moderating variables in the study and helps in directing the focus of the research[1]. The conceptual framework adopted in this study is indicated in Fig. 1

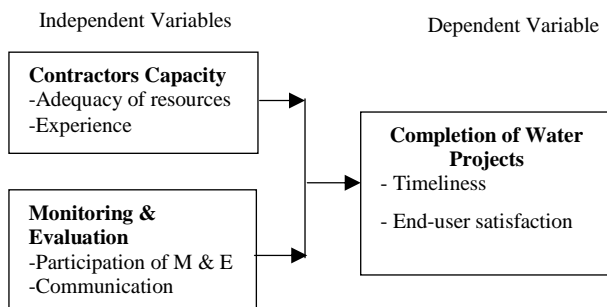


Fig. 1: Conceptual Framework showing relationship between variables

III. EMPIRICAL REVIEW

Over the years, project managers have increasingly utilised various measures to determine the success of their projects. Several studies have been carried out on factors affecting completion of projects in African countries and around the world. In Egyptian construction projects, [5] found that completion was hampered by slow delivery of payments, coordination problems and poor communication. In Zambia [6], found that the major causes of delayed completion, cost escalation and quality shortfalls in road construction projects were delayed payments, financial deficiencies on the part of the client or the contractor, contract modifications, economic problems, material procurement problems, changes in design drawings, staffing problems, unavailability of equipment, poor supervision, construction mistakes, poor coordination on site, changes in specifications, labour disputes and strikes. In Kuwait, [7] identified the main factors affecting cost and time overrun as inadequate/inefficient equipment, tools and plants; unreliable sources of materials on the local market and site accidents for construction projects. In Libya, the main causes of delays were improper planning, lack of effective communication, and a shortage of supply of materials i.e. steel, concrete, etc. design errors, slow decision making and financial issues [8]. In Tanzania, [9] found the main factors that influenced the completion of construction projects were design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues and disagreement on the valuation of work done.

In water projects in Kenya, [1] found that client-related factors such as financial capacity, owner interference, decision-making ability and scope variation; and consultant related factors such as financial capacity, equipment availability and quality, skilled workforce, site supervision ability, material availability, and control over sub-contractors have significant influence on project quality and time. On the other hand, consultant related factors such as supervisory ability, skilled personnel, co-ordination ability, experience and decision making ability significantly affect project completion [10]. In Kiambu County, [11] identified monitoring, financial capacity and contract variation as important factors that influence project completion time.

IV. SUMMARY AND CRITIQUE OF EXISTING LITERATURE

There are very few studies in Kenya which focus on project time and quality as a measure of project success. Most studies in Kenya concentrate on one aspect of quality, time or cost e.g a study by [12] on donor-funded projects in World Agro-Forestry Center (ICRAF) and cost [13] on road projects as a measure of project success. The apparent bias towards time and cost could be attributed to the relative ease in defining cost and time measurement parameters since the other parameter of quality is rather difficult to quantify as it is related to customer satisfaction while the other aspect of quality, client satisfaction, is dynamic and is influenced by the other two factors of time and cost. The study by [1] failed to address the salient issues of reporting and feedback in information flow and follow-up actions in a participatory M&E and how these affect project completion. Another study by [11] on factors influencing timeliness of project completion by Water Services Boards in Kenya using the case study of Athi Water Services Board was limited to only those factors that affect the construction phase of the project and did not consider the other phases of the project cycle such as project initiation and planning. The study was also narrowed to a sample size of only nine water projects all of which were located in one county of Kiambu. Therefore, to the best of the available knowledge, little has been done on the effect of capacity and M& E on water projects in other water service boards and more specifically on project quality and time as project completion criteria.

V. RESEARCH METHODOLOGY

This study adopted a descriptive survey research design[14]. A case study design was adopted so as to try and bring out deeper insights and a better understanding of the issues under study. Census technique was used to choose the subjects in this study. Therefore the entire target population of 200 engineers, who were directly involved in the construction of the respective projects was requested to participate in the survey as respondents. The questionnaire contained closed and open-ended questions.

The respondents were required to rank the factors affecting project completion on a 5-point Likert scale as follows; 1 for strongly disagree, 2- disagree, 3- neutral, 4 – agree and 5 – strongly agree. This was for the closed-ended questions while in the open-ended questions, the respondents were required to give more information and clarifications on some of the questions asked in the open-ended part.

A pilot study was done by sampling 15 respondents and the reliability and validity of the questionnaire were measured using Cronbach alpha coefficient. The reliability statistics were as indicated in Table 1.

TABLE 1: RELIABILITY STATISTICS

	Cronbach's Alpha	N of Items
Monitoring	.789	8
Contractor's capacity	.936	10
Project completion	.789	10

The reliability coefficients were above 0.7 and thus was accepted and used for the study.

VI. RESULTS AND DISCUSSION

1) Response Rate

Out of the 200 questionnaires administered, 168 were returned, representing 84% response rate.

2) Effect of Contractors capacity on project completion

The main factors considered under contractor capacity is the adequacy of resources and experience. In response to the question as to whether Contractor had adequate financial resources to support construction expenses, 92.9% (156) of the respondents did not agree that contractor had adequate financial resources to support construction expenses. This, therefore, implied that majority of respondents disagreed that contractor had adequate financial resources to support construction expense.

In response to the question as to whether the contractor had all required skilled personnel needed for the project before commencement, a majority, 64.3% (108), of the respondents did not agree that contractor had all required skilled personnel needed for the project before commencing construction. 64.3% (108) of the respondents did not agree that Contractor had all equipment and tools necessary for the project before commencing construction. 92.9% (156) of the respondents did not agree that contractor had goodwill from suppliers of construction materials who were ready to advance materials on credit. 57.1% (96) of the respondents did not agree that contractor had adequate relevant construction work-experience of similar nature and complexity. 71.4% (120) of the respondents did not agree that Contractor had good site management skills i.e site planning, and implementation scheduling and controls. 78.6% (132) of the respondents did not agree that contractor uses current techniques and methods in construction work. 85.7% (144) of the respondents did not agree that main contractor had control over project sub-contractors. 92.8% (156) of the respondents did not agree that the contractor complied with Health, Safety and

Environmental standards while 85.7% (144) of the respondents did not agree that contractor understood and was responsive to labour laws.

Correlation analysis shows that contractors capacity has a relatively strong and significant positive relationship with project completion ($r = 0.657$, $p < 0.05$) as indicated in Table 2. This concurs with the study by [1] who found that contractor's capacity has a significant effect on project completion in water projects in Kakamega County, Kenya. [4] also found contractor capacity to be significantly correlated to completion of road projects in Kenya.

TABLE 2: CORRELATION OF CONTRACTOR CAPACITY AND PROJECT COMPLETION

		Project Completion
Contractor's Capacity	Pearson Correlation	.657*
	Sig. (2-tailed)	.000
	N	168

*Correlation is significant at the 0.05 level (2-tailed).

Generally, contractor's capacity is an important element in the construction industry since these projects are capital intensive. Inadequate funds have a relationship with other factors such as machinery, labour and material acquisition. It also hinders the contractor from employing skilled labour and to acquire materials of the right quality and quantity. All these factors contribute to quality deterioration and project delays.

Inadequate or poor quality machinery can lead to project delay in cases of failure and consequently lead to cost escalation through an increase in overhead costs and labour for maintaining idle staff. Delay in project execution due to faulty or inadequate machinery lead to cost overruns occasioned by storage charges or inflation of the cost of materials.

Inadequate site planning, scheduling and control skills hinder the completion of projects. It would be difficult for the contractor to optimise the allocation of resources. It is important for contractors to utilise resources in critical activities which have a direct implication on completion timelines.

Enforcement of safety and labour laws at the work place is necessary for the attraction and retention of skilled. Contractor's need to adhere to labour laws including minimum wages and provision of a safe working environment.

3) Effect of monitoring and evaluation on project completion

The main attributes considered included the participation of M & E and the communication strategy. Stakeholders participated in identifying project M&E indicators of success. 72.0% (121) of the respondents did not agree that key stakeholders participated in the periodic assessment of the progress of project implementation from the initial planning stage. 85.5% (144) of the respondents did not agree that key stakeholders were committed to participating in project

monitoring and evaluation at all stages. 100% (168) of the respondents did not agree that stakeholders participated in identifying project M&E indicators of success. 100% (168) of the respondents did not agree that stakeholders participated in data gathering and analysis. 85.7% (144) of the respondents did not agree that the project team accurately and promptly reports on progress to key stakeholders as appropriate. 100% (168) of the respondents did not agree that results of M&E that were communicated often technically sound and relevant. 50% (84) of the respondents did not agree that communication channels for M&E are suitable. 78.6% (132) of the respondents did not agree that there is a timely distribution of M&E information to stakeholders.

For effective monitoring, all stakeholders involved in the project have to participate in the exercise. This enhances acceptability of the outcomes. Being public local leaders both at the national and local level formed an integral part of the monitoring team. This involvement of community members and the political class served to buy goodwill and acceptability of the project and therefore hasten the project implementation process. The consultants who formed the team involved in M & E were from the private sector.

The main monitoring tools used include inspection, statistical sampling and control charts which concurred with the study by [15] for housing projects in Nakuru County in Kenya. The inspection was done to ascertain the quality of construction work in terms of personnel, workmanship, and progress in activity execution. Control charts which include scheduling charts were employed to check the progress of tasks against the planned timelines. Cost control charts were used to measure the actual cost of the project activities against the budget plan. Statistical sampling was done to check the quality of construction materials used as compared with the design specifications and standards.

In construction projects, communication is effected through reports which are generated frequently by the contractor and consultant and submitted to the client. Site meetings form a structured way where project stakeholders notably the consultant, client and contractor meet to review the project progress. During the site meeting, any corrective measures are proposed. Variation orders are also communicated to the client by the contractor and vice versa. The consultant usually acts as the bridge between the client and contractor and therefore, is responsible for information and communication management. During M & E process, communication is key as it allows for the right and actionable remedies to be effected.

Monitoring had a weak but significant relationship with project completion ($r = 0.299$, $p < 0.05$) as illustrated in Table 3. [11] found a slightly higher relationship between monitoring and project completion time ($r = 0.448$, $p < 0.05$). However, [15] found a very strong positive relationship between monitoring and project quality ($r = 0.893$, $p < 0.05$).

TABLE 3: CORRELATION OF MONITORING AND PROJECT COMPLETION

		Project Completion
Monitoring	Pearson Correlation	.299*

	Sig. (2-tailed)	.000
	N	168

*. Correlation is significant at the 0.05 level (2-tailed)

Inadequate M & E affect the three critical elements of project success of time, scope (quality) and cost. Monitoring helps in the analysis of the progress of the implementation of the planned project activities, the costs and the scope of the works. Any deviation from the plan should be corrected and the plan is updated continuously to reflect changes observed during the monitoring. Inaccurate or inadequate reporting during M & E process lead to mistakes in the remedial actions which take the form of incorrect costs, time and design specifications. For instance, incorrect communication of variation orders leads to disputes when the contractor claims for payment. Similarly, incorrect reporting on design variation by the client jeopardises the attainment of project quality as defined as the client satisfaction.

The extent of participation in M & E process is relevant in project quality perspective. Exclusion of members of the public at any stage of project cycle lead to dissatisfaction and sometimes disruption to the actual implementation which lead to cost and time overruns.

VII. CONCLUSION AND RECOMMENDATION

The study found out that participatory M&E system does not exist at the project level. Consequently, key stakeholders did not participate in project-level M&E activities. The study further found that, at the institutional level, LVNWSB does not have an effective formal structure for M&E for its projects. All M&E reporting work was left to project team who may not objectively report about themselves. In addition, project progress reports prepared by the project team were not timely and accurate and M&E results communicated to stakeholders by project team were often viewed as not technically sound and relevant to stakeholder information needs. The study revealed that communication channels used to distribute M&E results were not effective. Monitoring had a weak but significant effect on project completion.

The study also found that most contractors lacked capacity. Most contractors had inadequate financial resources to support construction expenses. Most contractors did not have the key skilled personnel needed for the project. Most contractors did not have all equipment and tools necessary for the project before commencing construction lacked good will from construction material suppliers. Most of the contractors lacked adequate relevant construction work- experience. The majority of the Contractors did not have good site management skills such as site planning, and implementation scheduling and controls. Most of the main contractors had poor control over project sub-contractors. Most contractors were not responsive to Health, Safety and Environmental standards to labour-related laws. Correlation analysis indicated that these

factors had a strong and significant positive relationship between contractor capacity and project completion.

The Water Service Board's investment planning and monitoring structure should be streamlined to create departments headed by senior officers to coordinate all M&E matters at each Board. This will address the findings such as poor technical soundness of M&E reports and delays and challenges experienced in communicating M&E information.

Water Service Boards in Kenyan should adopt a common comprehensive result-based monitoring and reporting system for all project implementing agencies. For a start, the WSBs and could work with the ministry of planning who are rolling out the National Integrated Monitoring and Evaluation System.

Evaluation of bidders is largely done on the basis of the bid document. This alone is insufficient. To ensure that contractors have the required capacity to deliver projects, due diligence should be exercised at procurement stage to verify information and documents presented by the prospective contractors regarding their financial capacity, proposed staffing, and prove of past execution of similar projects in order to weed out incompetent contractors.

A cross-sectional analysis of project factors already identified in the various empirical literature on water projects among multiple WSBs and on other public sector implementing institutions in Kenya need to be studied further.

REFERENCE

- [1] E. K. Kanda, Y. Muchelule, and S. Mamadi, "Factors Influencing Completion of Water Projects in Kakamega County, Kenya," *International Journal of Research in Management, Science & Technology*, vol. 4, pp. 1-5, 2016.
- [2] I. A. Rahman, A. H. Memon, and A. T. Karim, "Significant factors causing cost overruns in large construction projects in Malaysia," *Journal of Applied Sciences*, vol. 13, pp. 286-293, 2013.
- [3] M. Sambasivan and Y. W. Soon, "Causes and effects of delays in Malaysian construction industry," *International Journal of Project Management*, vol. 25, pp. 517-526, 2007.
- [4] P. O. Ondari and J. M. Gekara, "Factors influencing Successful Completion of Roads Projects in Kenya," *International Journal of Arts and Entrepreneurship*, vol. 1, pp. 26-48, 2013.
- [5] M. E. El-Razek, H. A. Bassoioni, and A. Mobarak, "Causes of delay in building construction projects in Egypt," *Journal of Construction Engineering and Management*, vol. 134, 2008.
- [6] C. Kaliba, "Cost escalation, schedule overruns and quality shortfalls on construction projects," MSc. Thesis, University of Zambia, 2010.
- [7] P. Kouskili and N. Kartan, "Impact of construction materials on project time and cost in Kuwait," *Journal of Construction and Architectural Management*, vol. 11, pp. 126-132, 2004.
- [8] S. A. Tumi, A. Omran, and A. H. Pakir, "Causes of delay in construction industry in Libya," presented at The International Conference on Administration and Business, Bucharest, 2009.
- [9] G. J. Kikwasi, "Causes and Effects of Delays and Disruptions in Construction Projects in Tanzania," *Australasian Journal of Construction Economics and Building Conference Series*, vol. 1, pp. 52-59, 2012.
- [10] E. K. Kanda, Y. Muchelule, S. Mamadi, and D. Musiega, "The Effect of Consultant Related and External Factors on Completion of Water Projects in Kakamega County, Kenya," *International Journal of Civil and Structural Engineering Research*, vol. 4, pp. 19-25, 2016.
- [11] R. W. Ndungu, "Factors influencing the completion time of water projects in Water Service Boards in Kenya: A case of Athi Water Services Board, Kiambu county," MA. Thesis, University of Nairobi, Nairobi, 2014.
- [12] N. Gaturu and W. Muturi, "Factors affecting the timeliness of completion of donor-funded projects in Kenya: a case of world agro forestry centre (ICRAF)," *European Journal of Business Management*, vol. 2, pp. 189-202, 2014.
- [13] J. Choge and W. Muturi, "Factors affecting adherence to cost estimates: A survey of construction projects of Kenya National Highways Authority," *International Journal of Social Sciences and Entrepreneurship*, vol. 1, pp. 689-705, 2014.
- [14] O. M. Mugenda and A. G. Mugenda, *Research Methods: Quantitative and Qualitative Approaches*. Nairobi: ACT Press, 2003.
- [15] K. Asinza, E. K. Kanda, Y. Muchelule, and S. Mbithi, "Influence of Financial Capacity and Monitoring on Project Quality of Housing Construction in Nakuru County, Kenya," *International Journal of Research in Management, Science & Technology*, vol. 4, pp. 38-43, 2016.