

# Influence of Financial Capacity and Monitoring on Project Quality of Housing Construction in Nakuru County, Kenya.

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**Abstract** – The construction industry is one of the most important sectors for the development of infrastructure and economy of a Nation. It is therefore important that adequate measures are put in place to ensure quality in the sector. The objective of this study was to investigate the effect of monitoring and financial capacity on quality of projects in Nakuru County, Kenya. The instrument of data collection was questionnaires. The target population consisted of 32 construction companies in Nakuru. The unit of analysis was ongoing and completed projects implemented by the construction companies. The target population was 147 project implementation teams consisting of project engineers, project managers and project contractors in each of the 32 companies selected through random stratified sampling and thus the study had a total of 96 who formed the sample size out of which 87 respondents returned the questionnaires representing 90.6% response rate. Analysis of data was done using descriptive and inferential statistics. Monitoring factors considered were extent of monitoring and monitoring methods which had a strong and significant positive relationship with project quality ( $r = 0.893$ ,  $p < 0.05$ ). Under financial capacity, availability of finance and budgetary allocation had a significant positive relationship ( $r = 0.475$ ,  $p < 0.05$ ) with project quality. The overall regression model gave  $R^2$  of 0.354. This showed that about 35% of variations in project quality can be associated with financial capacity and monitoring.

**Key words:** Building projects, customer satisfaction, project budget, project completion, project specifications

## I. INTRODUCTION

The most common criteria for measuring project success is based on the triple constraint model; time cost, scope with quality being the central theme [1]. Project quality is important as it determines the functionality of the end product. The definition of quality depends on the point of view of the people who define it. Quality performance is considered as vital for client satisfaction in construction firms. It is crucial as it helps to increase the performance of an organization by optimizing their operations, customer's satisfaction and meeting the goals of business [2]. Quality in its simplest form can be defined as meeting the customers' expectations, or compliance with customers' specification [3]. Quality has three dimensions. It can be looked at in terms of process

quality, product quality and organizational quality. For construction firm quality is nothing but the satisfaction of customers and fulfilling of their requirements within a specified budget [4].

Quality problems occur due to lack of continuous improvement in process, and internal auditing problems, lack of trust with the supplier, poor training system and communication gap among project participants are a factor contributing to poor quality performance [5]. Quality in construction and more so in buildings is crucial and it is directly linked to structural safety. The collapse of a building is catastrophic with heavy penalties to occupants and investors. Quality in buildings is characterised by cracks, poor finishing, bent beams, slabs, and columns, leaking plumbing features and on the extreme cases sudden collapse among other features.

The aspect of quality is important at every stage of the project life cycle from conceptualization, planning and design, execution and commissioning. However, quality at the implementation stage is paramount as it determines the quality of the final outcome. Therefore, monitoring of all the components involved in the execution of the project such as materials, equipment, labour, and finance among others. Some of the tools used for monitoring quality include cost-benefit analysis, benchmarking, flow-charting, quality audits, inspection, pareto diagrams, control charts, statistical sampling and trend analysis [6].

Achievement of levels of quality that are acceptable in construction projects having long been a problem. There is still numerous quality problems despite a significant amount of investigation already being undertaken to examine quality failures and their causes [7]. In Kenya for instance, some buildings have been reported to have collapsed due to quality issues such as poor design and non-compliance, cost cutting by use of substandard materials, lack of quality control, incompetent contractors among others. In some instances home owners have been required to invest on costly repairs of the buildings after completion of the project [8].

This study focused on financial capacity and monitoring factors. These factors are within the control of contracting parties and are related in that financial capacity affects the extent of monitoring which subsequently affect the quality of housing projects. The objective of the study was to investigate the effect of financial capacity and monitoring on project quality among housing construction projects using Nakuru County as a case study. This would help various actors involved in the construction industry to project quality problems which have become frequent in Kenya's construction sector.

## II. CONCEPTUAL FRAMEWORK

A conceptual framework represents the main concepts or variables under study and their relationship with each other. It is a scheme of variables/concepts the researcher will operationalize in order to achieve the research objectives [1]. The conceptual framework used in this study is indicated in Fig. 1

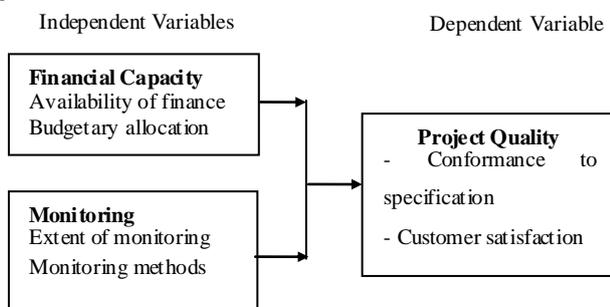


Fig. 1: Conceptual Framework

## III. EMPIRICAL REVIEW

Over the years, project managers have increasingly utilized various measures to determine the success of their projects. Several studies have been carried out on factors affecting quality of projects in African countries and around the world. Researchers recognized that the major performance problem in Gaza Strip was; average delay because of closures leading to materials shortage, escalation of prices of material, planned resources unavailability throughout the project duration. Unavailability of personnel with a high experience and qualifications, equipment quality and raw materials in the project, and project manager's leadership skills [9]. A study by [10] found the main factors that affected the quality 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 Malaysia construction projects [11] as part of developing countries identified cause of quality failure in building construction project, quality issues, and examined the quality performance in construction projects as an interaction of financial issues relating to the client and contractor which lead to project delays and subsequently quality. Also [6] identified problems of sub-contractors' work, ineffective communication, increase in cost and time as challenges

impeding the implementation of quality management in the construction industry. In road construction projects in Zambia, a study by [12] identified the most significant causal factors for quality shortfalls as inadequate and inconsistent release of funds by clients, poor financial management by contractors, long lapse between feasibility study and implementation of projects, inadequate supervision, and incompetence or lack of capacity by contractors. The factors that influence construction quality implementation at the execution phase in Indian construction industry include financial limitation, inadequate skilled labour, poor construction methods, time constraints, inappropriate communication, and weather [13].

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. On the other hand, consultant related factors such as supervisory ability, skilled personnel, co-ordination ability, experience and decision making ability significantly affect project quality [14]. In Mombasa County in Kenya, [15] found that the most important factors that lead to collapse of buildings include poor quality materials, scope variations by the owner during actual construction and poor management by professionals.

## IV. SUMMARY AND CRITIQUE OF EXISTING LITERATURE

There are very few studies which focus on project quality as a measure of project success. Most studies in Kenya concentrate on time e.g a study by [16] on donor-funded projects in World Agro-Forestry Center (ICRAF) and cost [17] on road projects as a measure of project success. The apparent bias towards time and cost could be attributed to the relatively ease in defining cost and time measurement parameters. A study by [5] on factors affecting quality in the delivery of public housing projects in Lagos in Nigeria found that five most important factors affecting quality of public housing projects comprising of poor communication of design requirements by owners, poor labour skills and supervision, lack of clarity in project design and build ability problems, availability of skilled labour and availability of materials. The study left out of monitoring. Another study by [10] investigated the causes of quality failures in the building construction projects. The results showed top five causes of quality failure that insufficient skill levels among workers, inadequate reviews of the design and engineering drawings, lack of site layout studies, poor quality improvement programs, and lack of training personnel. Therefore, it can be concluded that most researchers have concentrated on other factors and little done on financial

capacity and monitoring and more so with respect to project quality. Being a developing economy, Kenya's housing projects is faced by myriad of problems relating to quality whose genesis can be summed up by insufficient funds which influence the choice of monitoring methods, actors involved in monitoring, site supervision and management, quality of materials used, contractors involved and the enforcement of standards and specifications.

#### V. RESEARCH METHODOLOGY

This study adopted a descriptive survey research design[18]. A case study design was adopted so as to try and bring out deeper insights and better understanding of the issues under study. Simple random sampling and disproportionate stratified random sampling was used to choose the subjects in this study. Simple random sampling was used to determine the overall number to be selected from the target of 147 and disproportionate sampling was used to allocate the number of those to be sampled from the 49 construction companies. Random sample of 96 people were selected to be respondents in the study. This represented 65% which was above 30% suggested by [19] as the sample size. This sample was disproportionately divided into 4 strata and 3 respondents from each of the 32 construction companies randomly selected. The questionnaire contained closed and open ended questions for ease of analysis.

The respondents were required to rank the factors affecting project quality on a 5-point Likert scale as follows; 1 for strongly disagree, 2- disagree, 3- neutral, 4 – agree and 5 – strongly agree.

Pilot study was done by sampling 18 respondents and the reliability and validity of the questionnaire was 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	.745	8
Financial capacity	.710	8
Project quality	.725	9

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 96 questionnaires administered, 87 were returned, representing 90.6% response rate.

##### 2) Effect of Financial capacity on project quality

The main factors considered under financial capacity is the availability of finance and the budgetary allocations. In response to the question as to whether on the question as to whether there are adequate funds to finance projects, 55.2 % of the respondents agreed and 16.1 % strongly agreed. This therefore implied that majority of respondents (71.3%) agreed

that there is adequate funds to finance projects during project implementation.

In response to the question as to whether as to whether cash budgeted for the project last throughout the project period, 37.9 % of the respondents strongly agreed and 33.3 % agreed. This therefore implied that majority of respondents (71.2%) agreed that cash budgeted for project lasts throughout the project period.

Correlation analysis shows that financial capacity has a relatively weak but significant relationship with project quality ( $r = 0.475, p < 0.05$ ) as indicated in Table 2.

TABLE 2: CORRELATION OF FINANCIAL CAPACITY AND PROJECT QUALITY

		Project quality
Financial Capacity	Pearson Correlation	.475*
	Sig. (2-tailed)	.007
	N	87

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

Financial capacity is an important element in the construction industry since these projects are capital intensive. Contractors responsible for housing construction need to have substantial finances more so in public projects where the government (client) might delay releasing funds and so lead to project delays.[20] found that contractors in Mavoko Municipality in Kenya rely on clients to release payment for construction of houses and these led to inconvenience in terms of project delays.

Inadequate funds has a relationship with other factors such as machinery, labour and material acquisition. Inadequate funds hinders the contractor from employing skilled labour and acquire materials of the right quality and quantity. Also if funds are unavailable, contractors might not procure good quality machinery. All these factors contribute to quality problems in the construction industry. [15] found that contractors in Mombasa County of Kenya do not use the materials in the design documents but substitute it with local and cheap materials to save on costs and they also use unqualified people to manage their projects due to the high costs associated with professionals. Finance also influence the ability of small contractors or low income clients to seek approvals of building plans and designs, material quality samples and other standard procedures.

##### 3) Effect of monitoring on project quality

The main attributes considered include the extent of monitoring and the methods of monitoring employed.

The extent of monitoring was evaluated in terms of the frequency of monitoring at each stage of construction. Majority of the respondents (63%) agreed that the monitoring was done frequently at every stage of the project implementation. For effective monitoring, all stakeholders involved in the project have to be participate

in the exercise. This enhances acceptability of the outcomes. Majority of the respondents agreed (60%) that all stakeholders participated in the monitoring exercise. The main participants in the monitoring process were the client (owner), consultants and contractors in the case of private housing projects. In the case of public projects where the government is the owner, the other local political leaders and members of the public often formed an integral part of the monitoring team. These 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 in the case of public housing projects were mainly architects and engineers from the department of public works and housing and in some instances private consulting firms. However, for private housing projects, monitoring is hindered by the use of unqualified personnel since professionals such as engineers and architects are expensive for the small contractors or clients with low incomes as argued by [15].

The methods used to monitor project progress should be well understood to enable corrective measures to be undertaken in a timely and cost effective manner and consequently achieve the desired target. The adherence to these methods also helps in the consistency of the remedial actions at every stage. 80% of the respondents agreed that monitoring methods used are well understood and 70% responded on the affirmative to the question as to whether the organization adheres to the monitoring criteria and guidelines.

The main monitoring tools used include inspection, statistical sampling and control charts. The inspection was done to ascertain the quality of construction work in terms of personnel, workmanship, and progress in activity execution. During inspection, the parties get to check the quality of material such as the concrete mixing, the concrete mix ratios, the process of casting of various components such as slabs, beams, floors, erecting of scaffolding, trusses, and steel structures among other activities. Control charts which include scheduling charts were employed to check the progress of tasks against the planned timelines. In cases where the project is behind schedule measures such as crashing of activities and refocusing of resources to critical activities are undertaken. Cost control charts were used to measure the actual cost against the budget plan and thus it helps in managing the cost of the project and put corrective measures. Statistical sampling was done to check the quality of construction materials used against the design specifications and standards. The major tests performed on the materials include the compressive strength of hardened concrete, workability of fresh concrete, tensile strength of reinforcing bars, crushing strength of aggregates, flakiness of aggregates among others. The high cost of material testing is a hindrance to small scale contractors. Post-commissioning quality audits were seldom applied in the case of public projects as it was assumed to be covered by the defect liability period which is under the remedial works of the contractor. In most cases, the contractor leaves the site after commissioning and never returns for any remedial or correcting measures. These concurred with studies by [21] for construction projects in

Palestine where the main monitoring tools were identified as inspection, control charts and statistical sampling. Quality audits of the project after completion should be incorporated in the monitoring and evaluation plan. The government rarely puts money in evaluation of projects after completion. Commissioning of government funded projects is always characterized by pomp and colour due to the presence of politicians who would want to gain political mileage but after that little effort is done on evaluation.

Monitoring of housing projects had a strong and significant relationship with project quality ( $r = 0.893$ ,  $p < 0.05$ ) as illustrated in Table 3.

TABLE 3: CORRELATION OF MONITORING AND PROJECT QUALITY

		Project quality
Monitoring	Pearson Correlation	.893*
	Sig. (2-tailed)	.000
	N	87

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

Regression analysis was carried out to determine the cause-effect relationship between financial capacity and monitoring on project quality. The multiple regression gave an overall  $R^2$  of 0.354 which indicate that the variations around the means of monitoring and financial capacity account for 35.4 % of variations in project quality. The remaining source of variation is associated with factors not considered in this study. The regression model developed is illustrated in Equation 1.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \epsilon \quad [1]$$

Where  $Y$  = project quality,  $\alpha$  = regression constant,  $\beta_1$  and  $\beta_2$  = regression coefficients,  $X_1$  = project monitoring,  $X_2$  = financial capacity and  $\epsilon$  = error term.

Replacing the above terms with the values shown in Table 4 and ignoring the error term gives the model given in Equation 2.

$$Y = -0.361 + 0.236 X_1 + 0.128 X_2 \quad [2]$$

TABLE 4: REGRESSION COEFFICIENTS

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-0.361	.116		-2.134	.003
Monitoring	.236	.071	.113	1.163	.021
Financial capacity	.128	.014	.103	2.140	.001
a. Dependent Variable: Project quality					

From Table 4, it can be deduced that financial capacity and monitoring are significant in influencing project quality. From Equation 2, the two factors have positively influence project quality with monitoring having a higher positive effect on project quality than financial capacity which imply that significant resources can be allocated to monitoring to enhance attainment of project quality.

#### VII. CONCLUSION AND RECOMMENDATION

This study found out that financial capacity affects project quality. Adequate funds to finance the project and sufficient cash flow to implement project have led to quality standards. There was sufficient cash budgeted for projects during financial allocation of which the budgeted cash was strictly for the planned project. The organization also made a regular comparison of actual cost with a budgted cost during project implementation so as to be able to plan well with actual cost.

Monitoring was adhered to by the organizations involved in the construction of houses in Nakuru County where the main methods of monitoring include inspection, control charts and statistical sampling. The monitoring process involved the stakeholders in the project who are mainly the client, consultants and the contractors. In cases of public projects, the community opinion leaders and the general public were involved. The public need to be involved also in the case of private projects since they are the ultimate target in the utilization of the final product. This would help the project developers in incorporating their views and enhance product acceptance and marketability. Post-comissioning quality audit need to be incorporated in public housing projects so that the final quality of the housing facility satisfy all the stakeholders.

Financial capacity and monitoring have significant effect on project quality. This imply that these two components need to be adhered to at all stages of project lifecycle as it will determine the functionality of the housing facility developed.

Regression analysis indicate that the 35% of variations in project quality can be associated to financial capacity and monitoring. These indicate that there are other factors which have influnce on project quality which were outside this study.

The recommendations for futher research include;

- 1) The effect of external factors such as political interefence, taxation, lincensing procedures and chnages in the macro-economic environmentin the quality of housing projects in Kenya.
- 2) The effect of communication mechanisms in the quality of construction projects
- 3) The utilization of project management tools and computer softwares and its effect on quality of housing projects in kenya.
- 4) Cross-sectional analysis of project quality factors on other public sectors in Kenya

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