

INFLUENCE OF QUALITY MANAGEMENT PRACTICES ON SUCCESSFUL COMPLETION OF BUILDING CONSTRUCTION PROJECTS IN NAKURU TOWN, KENYA

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ABSTRACT: This study aimed at examining the quality management practices of building contractors in Nakuru town and how these practices influence successful completion of projects. The study utilized the descriptive survey design where a sample of 107 building contractors was selected from the target population of 335 National Construction Authority registered building contractors in Nakuru town using the proportionate stratified sampling method. Data was collected from the selected companies using structured questionnaires, and analyzed using both descriptive and the multiple linear regression technique. Results revealed that all the four components of quality management have a statistically significant and positive relationship with successful completion of building construction projects in Nakuru town. The study recommended that building construction firm invest in quality management especially quality improvement in order to increase their rate of project completion success. Policy makers should also introduce quality management courses in the training curricular of key construction workers such as engineers and project managers so as to improve the implementation of construction projects.

KEYWORDS: National Construction Authority (NCA), Quality Management Practices (QMP), Construction.

1 INTRODUCTION

Quality management is one of the knowledge areas in project management. It is a discipline that seeks to ensure that the outcomes and benefits of projects are fit for purpose and meet requirements (Project Management Institute, 2013). Quality management has four main components: quality planning, quality assurance, quality control, and quality improvement.

The building and construction industry is one of the key pillars of the Kenyan economy. According to Macharia (2015), this industry grew by 13.1 % in 2014 fueled by steady expansion in real estate sector and the commissioning of massive infrastructure projects. This industry contributed to 4.8% of the Kenya GDP, a rate that translate to Kshs. 5.36 trillion. This growth was reflected in cement consumption trends which increased to 5,197 thousand tones in 2014 from 1,726 thousand tones in 2006 (Kenya National Bureau of Statistics, 2015). Loans and advances by commercial banks to this sector also increase from Kshs. 70.8 billion to Kshs. 80.4 billion between 2013 and 2014. The value of private building plans was in Nairobi alone was estimated Kshs. 205.4 billion while the value of completed building stood at Kshs. 59.1 billion. Workers in this sector received an average monthly wage of Kshs. 45,743.

The building construction industry in Kenya has, however, been bedeviled by various issues. A significant problem entails safety violation associated with the use of substandard building materials, failure to observe protocols, and erecting buildings in unsafe sites. This problem has been illustrated by the collapse of several buildings across the country including the sunbeam building, Nyamakima building, and most recently, the Huruma building that claimed over 40 lives (Wawira, 2016; Mathenge, 2012). The National Construction Authority (NCA) claims that it has shut down over 500 construction sites countrywide due to safety violation with 204 buildings in Nairobi set to be demolished in Nairobi (Otieno & Ogutu, 2016). Although necessary, the action taken by NCA is bound to have significant consequences to contractors and their clients including massive financial losses and potential lawsuits.

A report by Orwa (2009) stated that Nakuru soils are unstable due to fault lines and escarpments. In 2008, there was appearance of large fault line across Mai mahiu road near Longonot creating a gaping hole caused massive traffic jam on the road and also destroyed farms and houses. Due to unstable soil in Nakuru town, the town council ruled limiting construction to not more than seven floors since some area in Nakuru lie on the fault line while others lie on the escarpment. But still some developers have ignored that. There have been a few cases of buildings collapsing while still under construction, for example, Uchumi supermarket in Nakuru east sub-County collapsed while it was still under construction, a residential flat also collapsed 7 years ago, in shabaab estate when it was already occupied likely no tenant was injured. Therefore the ongoing constructions in Nakuru are seriously supervised by the county engineers, planners, health departments and the National Environment Management Agency to make sure all the laid procedures and laws are followed to the latter.

1.1 SIGNIFICANCE OF THE STUDY

Findings of the study was expected to be beneficial at policy level as they will highlight quality management components and practices that have a significant influence on project implementation success. This knowledge will guide policy makers in establishing training programs and curriculum for engineers, project managers, technical managers, architects, and quantity surveyors. It has also provide evidence for guiding the formulation of rules and regulations for governing quality issues in the building construction industry.

Findings were also expected to be beneficial to contractors and building companies as they highlight components and practices to which they need to pay attention when it comes to the management of the quality of their projects. The study highlights best practices that the contractors need to adopt in order to improve project outcomes and avoid losses. Findings were also be beneficial to researchers and academicians in the project management field as it will add knowledge regarding the relationship between quality management and project success. The study will also identify new areas for future studies.

1.2 STATEMENT OF THE PROBLEM

The building construction industry is a key pillar in the Kenyan economy as it contributes 4.8% to the country's GDP and employees thousands of people. The industry also supports other sectors such as steel and cement manufacturing, catering, and banking. In addition, the building construction industry plays a critical role in meeting the housing needs of the people. However, this industry is plagued by a number of problems the most significant became gross safety violation manifested by a series of incidents of collapsed buildings across the country. It is estimated that construction industry is responsible for 27% of fatal injuries to employees, which affects the completion rate of projects. The average completion rate for government construction projects is 35.6%, which is dismal. In Nakuru, studies have shown that the soils are unstable due to fault lines and escarpments, thus making quality management practice in construction. Theories of quality management practices suggests that quality management is one of the knowledge areas that project managers need to master in order for them to implement projects successfully. Despite the significant safety problems encountered in the Kenya construction industry, no study has been conducted to examine the quality management practices of players within the industry and how these practices influence project outcomes. This study was seeking to address this knowledge gap by examining quality management practices of building contractors operating in Nakuru Town and how these practices influence the successful completion of projects.

1.3 THE GENERAL OBJECTIVE

To examine the influence of quality management practices on successful completion of building construction projects in Nakuru Town.

1.4 SPECIFIC OBJECTIVES

- To find out the influence of quality planning practices on the successful completion of building construction projects in Nakuru Town.
- To determine the influence of quality assurance practices on the successful completion of building construction projects in Nakuru Town.
- To evaluate the influence of quality control practices on the successful completion of building construction projects in Nakuru Town.
- To examine the influence of quality improvement practices on the successful completion of building construction projects in Nakuru Town.

2 LITERATURE REVIEW

This study was guided by three theories: Juran's Theory of Quality Management, Deming's Theory of Total Quality Management, and Shenhar, Levy, and Dvir's Four Dimensions of Project Success.

2.1 EMPIRICAL REVIEW

The goal of the section was to provide a foundation for the research project, position the study within the existing body of literature, and identify research gaps.

a. INFLUENCE OF QUALITY PLANNING ON SUCCESSFUL COMPLETION OF PROJECTS

Quality management activities, like any other aspect of business, must be well thought-out and directed. Strategies and action plans for managing quality must be properly coordinated and be aligned with other initiatives within the firm. This what quality planning entails. It is a process that seeks to provide a structured sequence of activities that should be completed in order to improve and sustain quality (Senaratne & Jayarathna, 2012). It entails providing a road map on how the organization intends to realize quality goals. The quality planning process should culminate in the development of a quality plan, which is a document that describes how quality was achieved during the project.

In Kenya, Githenya and Ngugi (2014) examined the determinants if housing projects implementation. Their study revealed that quality planning was among the significant factors that influenced housing project implementation. Ong'ondo (2016), in his study that investigated preconstruction planning in the Kenya construction industry, found that the most important issues that project managers ought to pay attention to include clarity of scope statement, clarity of performance benchmarks, competency of project teams, and clarity of roles. Wambugu (2013) also found that quality planning was one of the determinants of successful completion of rural electrification projects in Kenya.

b. INFLUENCE OF QUALITY ASSURANCE ON SUCCESSFUL COMPLETION OF PROJECTS

Having an elaborate quality management plan is only a starting point of the quality management process. After a plan has been formulated, the project team has to take step of ensuring quality goals stipulated in the plan are realized. Quality assurance is one of these essential steps. Quality assurance is a proactive approach of managing quality. It entails putting in place checks that will ensure that quality is built into the project from the start (Goswami, 2015). It may encompass activities such as hiring qualified staff, selecting qualified and committed suppliers, training of staff and suppliers, improving the level of employee and supplier engagement, monitoring and inspecting inputs to ensure they meet required standards, and analyzing and approving designs (Bhonde & Shaikh, 2015). The prime objective of quality assurance is to avoid defects.

There are a number of studies that have examined quality assurance practices in the context of project management. In their study, Ruxwana, Herselman, and Pottas (2014) examined quality assurance practices in the implementation of e-health programs in five rural hospitals located in the Eastern Cape Province of South Africa. Results revealed that there were a number of weaknesses in the application of quality assurance such quality assurance being formally applied in structured manner, lack of user involvement, and the absence of independent QA evaluations. However, it was established that despite these limitations, quality assurance contributed to the success of some e-health projects. Khraiwesh (2014) found that quality assurance increased the probability for success of software engineering projects by offering adequate level of confidence that the end product will satisfy quality requirements.

c. QUALITY CONTROL AND SUCCESSFUL COMPLETION OF PROJECTS

Quality control is another important step in quality management. Quality control entails inspecting and analyzing project outputs so as to determine whether these outputs meet pre-established standards (Goswami, 2015). Where it is found that the outputs fall short of the required standard, the quality control officer is expected to initiate corrective measures. In the construction setting, corrective measures may entail reworking some parts of the building. Unlike quality assurance that focuses on preventing defects, the goal of quality control is to identify and correct defect. It is a reactive approach of managing quality. However, it is a necessary step in quality management since it may not be possible for the project team to achieve 100% defect prevention.

In their study, Githenya and Ngugi (2014) found that there was a significant relationship between project control measures and successful implementation of housing projects. The regression model showed that a unit increase in project control measures leads to 0.766 increase in the probability for successful implementation of projects. The authors recommended that project managers should focus on developing adequate control measures over every aspects of the

project including quality. Wambugu (2013) found that the supply of quality materials was a critical determinant for successful completion of rural electrification projects. It was revealed that unreliable supply of materials cause project delays and dampened the moral of workers resulting in low productivity.

d. QUALITY IMPROVEMENT AND SUCCESSFUL COMPLETION OF PROJECTS

Quality improvement is also an important element in the quality management process. It entails taking deliberate actions aimed at raising the standards of quality (Huemann, 2004). Quality improvement is a popular concept in routine manufacturing and service activities. However, the concept is not so common in the project management setup because most practitioners view projects as independent and temporary undertaking. This perception is misleading especially in the context of construction project where contractors are involved in the implementation of multiple projects (Harnadez & Aspinwall, 2008). In such settings, quality lessons and improvement learnt in one project can be transferred to subsequent projects.

In different study, Pestana, Alves, and Barbosa (2014) demonstrated that it is possible to apply Lean methodology to identify and eliminate quality gaps in construction projects. The authors utilized the action research design where they used the Lean methodology to map deficiencies in the administrative processes of two construction projects. This process enabled the teams managing the two projects to plan improvement efforts. Taner (2013) also provided evidence that shows successful application of Six Sigma in large-scale construction projects in Turkey. The study several factors were key to the successful application of Six Sigma including leadership and commitment of top management, linking quality initiatives to customers, and linking quality initiatives to suppliers.

e. SUCCESSFUL COMPLETION OF BUILDING CONSTRUCTION PROJECTS

The term project success is quite ambiguous. The point at which a construction project can be considered to have been completed successfully is not clearly defined. In most cases, the success of project is evaluated from the perspective of the project management triangle (Kylindri, Blanas, Henriksen, & Stoyan, 2012). This model suggested that a project is successful when it is completed on time, within budget estimates, and meets all predetermined specifications. However, the concept of project success has been enriched and expanded beyond the three project constraints. Prabhakar (2008) recommended the inclusion of stakeholder satisfaction as an additional measure of project success. He noted that a project may be completed on time, within budget, and meet all pre-established requirements, but fail to meet the expectations of key stakeholders such as the customer.

Stakeholders' satisfaction can be an important measure of project success in the building construction industry. Due to its technical nature, key stakeholders may not be able to articulate their expectations and preferences at the beginning of the projects. Therefore, project managers have the responsibility of ensuring that key stakeholders are involved at every step of the project so as they can clarify their expectation on continual basis. Chan (2001) argues that a building project cannot be considered successful if the end product does not meet health and safety standards. When accidents occur, they expose the contractor and client to legal actions and financial loss.

In their study, Shenhar, Levy, and Dvir (1997) proposed four dimensions for measuring project success: project efficiency, impact on customer, business success, and preparing for the future. Project efficiency is concerned with short term measures such as projects being completed on time and within specified budgets. Impact on customer assess whether the project has deliver expected benefits to customers. This dimension measures the outcomes of the projects rather than the output (Kylindri et al., 2012). The business success dimension assesses the impact of the project on the business/ contractor in terms of profitability and market share. This dimension can only be measured after one or two years. The final dimension examines the long-term impact of the project such as improving the organization technological infrastructure and organizational learning. This dimension can only be assessed three to five years after project completion.

2.2 RESEARCH GAPS

There is a wide body of literature exploring quality management practices in construction projects. Most of these studies have highlighted quality management processes in projects and recommended best practices. Very few studies have linked these quality planning components with project success. In addition, a majority of the studies exploring quality management practices in the construction industry have been conducted outside the country. The findings may not be applicable in the Kenya context due to political, economic, social, and technological factors that usually unique in each country. There is gap in knowledge regarding the quality management practices in Kenya building constructing industry and how these practices are linked to successful completion of projects. The study was seeking to address this gap in knowledge by exploring quality

planning, control, assurance, and improvement practices on housing construction projects and how they influence the successful completion of project.

3 RESEARCH METHODOLOGY

The study utilized the descriptive survey design where a sample of 107 building contractors was selected from the target population of 335 National Construction Authority registered building contractors in Nakuru town using the proportionate stratified sampling method. Data was collected from the selected companies using structured questionnaires, and analyzed using both descriptive and inferential techniques.

4 RESEARCH FINDINGS

In this study, the inferential analysis focused on evaluating the relationship between the various quality management practices and successful completion of building construction project in Nakuru town. The multiple linear regression technique was used with the following model being tested:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon,$$

Where Y represents successful completion of building construction projects; X₁=quality planning practices; X₂= quality assurance practices; X₃= quality control practices, X₄= quality improvement practices, and ε = Error term. Table 4.10 present a summary of the model. As the table shows, the adjusted r-square is 0.853, which indicates that the model explain 85.3% of changes in project completion success.

Table 1: Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.927 ^a	.860	.853	.42528

a. Predictors: (Constant), Quality Improvement, Quality Assurance, Quality Control, Quality Planning

According to Toole (2013), a model that yield an R square of above 0.25 is considered to be of good fit in social science research. Table 2 present the analysis of variance (ANOVA) of the model. The ANOVA test examines the significance of the relationship between the independent variable and the dependent variable by comparing the predicting power of the model with that of an intercept only model (Faraway, 2002). As the Table shows, the ANOVA test yielded a P-value of 0.00, which suggest the existence of a statistically significant relationship between project completion success, and the four quality management practices (quality planning, quality assurance, quality control, and quality improvement practices).

Table 2: ANOVA for Model I

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	82.325	4	20.581	113.792	.000 ^b
	Residual	13.384	74	.181		
	Total	95.709	78			

a. Dependent Variable: Project Completion Success

b. Predictors: (Constant), Quality Improvement, Quality Assurance, Quality Control, Quality Planning

Table 3: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.375	.091		4.121	.001
	Quality Planning	.252	.116	.235	2.163	.034
	Quality Assurance	.310	.112	.291	2.768	.027
	Quality Control	.377	.086	.354	4.361	.000
	Quality Improvement	.366	.075	.399	4.877	.000

a. Dependent Variable: Successful Project Completion

The table 3 above yielded a P-value that is less than 0.05, and therefore, suggests that there is a statistically significant relationship between quality management practices and successful completion of building construction projects in Nakuru town at the 0.05 level of significance.

ESTIMATED REGRESSION EQUATION

Based on the Beta coefficients in Table 3, the estimated regression equation was:

Successful Completion of Projects (Y) = 0.375 + 0.252X₁ + 0.310X₂ + 0.377X₃ + 0.366X₄. The equation shows that quality control practices have the most significant influence of successful completion of projects. The beta coefficient of 0.377 implies that, holding other factors constant, increasing quality control efforts by 1 unit would increase level of project completion success by 0.377 units. Quality planning practices have the least influence on successful completion of projects as the beta coefficient suggests that improving quality planning practices by 1 unit would increase level of project completion success by 0.252.

5 CONCLUSION AND RECOMMENDATIONS

Research findings have led to the conclusion that quality management practices have a significant influence on the successful completion of building construction projects. The study has established that all the four components of quality management (quality planning, assurance, control, and improvement) have a statistically significant and positive relationship with successful completion of building construction projects in Nakuru town.

The study has established that quality management practices have a significant influence on successful completion of projects. Consequently, building construction companies should enhance their quality management practices in order to increase their rate of project completion success. The firms should particularly invest in quality improvement activities since quality improvement was found to have the most significant influence of project success.

At the policy level, stakeholders should introduce quality management course in the training curriculums of key staff in the construction industry such as engineers and project manager in order to improve the implementation of construction projects. Training courses should incorporate all the four components of quality management (quality planning, assurance, control, and improvement). Regulatory bodies in the building construction field should also enhance the monitoring activities so as to ensure all contractors adhere to quality standards.

Future study should examine the quality implication of this informal construction system. Lastly, the current study was only able to establish whether a significant relationship exist between quality management practices and the successful completion of projects, as well as, the direction of this relationship due to its quantitative nature. A qualitative study is needed to explain why this relationship exists.

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