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## Factors Affecting the Performance of Construction Projects in Kenya: A Survey of Low-Rise Buildings in Nairobi Central Business District

**Everline Auma**
Student, Jomo Kenyatta University of Science & Technology, Nairobi, Kenya

*Abstract:*
*There is evidence that the performance of the construction in Kenya is poor as time and cost performance of projects are to the extent that the majority of the projects initiated are likely to escalate with time, with a magnitude of over 50% and over 50% of the projects likely to escalate in cost with a magnitude of over 20%. The main objective of this study was to investigate the factors affecting the performance of construction projects in Kenya.*

*The literature identifies numerous potential factors that could be affecting the performance of construction projects in Kenya. Although this significant body of knowledge exists, extant review of the literature suggested that there is a lack of rigorous theoretical and empirical examination to establish the major factors that are likely to affect the performance of construction projects. Given the very strategic importance of construction sector in Kenya, especially in respect to its contribution to the development of local government areas of the economy, its evaluation of the knowledge of the underlying factors affecting performance in the industry could be useful in developing a framework towards effective performance management and improvement in the sector.*

*Simple random sampling was used to sample the respondents. Questionnaires were used to collect data that were used to in the processing and analysis of findings. The data was analyzed by use of SPSS toolset and was presented in tables and charts. The result shows that the majority of projects executed had a higher percentage of cost overrun, were delayed in time and client were sometimes satisfied with the project. Higher percentage of respondents agreed that the cost of equipment and materials, cost of variation orders, cost of rework and escalation of material prices are the cost factors that affect the performance of construction project. Percentage of orders delivered late, delay in claim approval and delay of payment from client to contractor are time factors that affect the performance of construction project. Qualification and experience of staffs, quality of equipment and materials, conformance to specification are quality factors while leadership factors are staff training and leader's professional qualification are factors that affect the performance of construction projects. From these findings, performance of construction project is influenced by the cost of materials, time management, quality management and the leadership style adopted on site. Therefore, the contractors should take precautions on all matters that might affect the project performance.*

## 1. Introduction

### 1.1. Background of the Study

Construction industry has complexity in its nature because it contains a large number of parties such as clients, contractors, consultants, stakeholders, shareholders, regulators and others. Construction projects in the Gaza Strip suffer from many problems and complex issues in performance, such as cost, time and safety (Shaban, 2008). Client satisfaction is therefore a fundamental issue for construction participants who must constantly seek to improve their performance if they are to survive in the global marketplace. However, client satisfaction has remained an elusive issue for a majority of construction professionals (Cheng, Fleming, Proverbs&Oduoza, 2005).

Due to the demand for built products from foreign investors and the growing economy, Vietnam's construction industry, experience strong growth. While some of the construction projects are successfully executed, others faced difficulties (Bui &Ling, 2010). Despite the availability of various control techniques and project control software many construction projects still do not achieve their cost and time objectives (Oluwale& Sun, 2010).

Most third world countries face acute endemic housing problem that over the years has raised both national and international concerns. Habitat and World Bank, for example, fund many housing schemes worldwide in addressing the housing issue. Likewise, governmental and non-governmental institutions foster and orchestrateself-help campaigns directed at reducing inherent housing deficiency in these poor nations. However, a growing number of unfinished buildings in such countries seem to overshadow the efforts and thus pose many questions as to what is behind the failure in providing such a highly needed commodity. One may wonder whether such a failure has anything to do with architecture, attitudes and practices of the people or is it just a thing to be pegged on socio-economic platform of the society (Mirema&Mhando, 2005). Construction cost is one of the most important criteria of success of projects throughout the lifecycle of the project and is of high concern to those who are involved in the construction industry. In order to manage construction project successfully various procurement strategies have

been introduced. In spite very rarely projects are completed within estimated budget (Abdullah, Aftab,Azis&Rahman, 2010). Maintaining steady cost projection on construction projects had been until recently an issue of serious concern, both to the client and project contractors. Cost deviation from initial cost plan, had been prevalent on construction sites (Amusan,n.d).

Every year, large companies spend large sums on the research and development about the most optimum combination of production or the most optimum function and feature of their products and services. The impact of poor quality on the price of products and organization earnings and the amount of cost should be paid for high quality has raised many important issues affecting cost accounting, quality control, repairs and maintenance, supply chain, production management, stores, safety and health, education and improvement and so forth (Amin, 2011).

One of the most important facets of managing a construction company is leadership. Although the issue of leadership has been widely covered in management or business school, little attention has been given to the study of managerial behavior or style of the leaders in construction projects (Bresnen et al., 1986). Learning from high performance projects is crucial for construction improvement. Therefore, we need to identify outstanding projects or role models.

A minimum prerequisite for identifying such projects is the ability to measure the performance. Unfortunately, two issues complicate the measuring task: i) diseconomies or economies of scale and ii) multidimensional inputs and outputs (Myrtveit&Stensrud, 2005).

In view of key performance indicators, the construction industry is generally considered to have underperformed compared to other industries. Not only that, the UK construction industry has been criticized for not performing at the same level as that of other developed countries. In relation to this, the UK working groups on Key Performance Indicators (KPIs) have identified ten parameters for benchmarking projects, in order to achieve a good performance, in response to Egan's report. These consist of seven project performance indicators, namely: construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service; and three company performance indicators, namely: safety, profitability and productivity (Akintoye&Takim, 2002).

Ankrah and Proverbs (2005)  showed that despite the inherent benefits of performance measurement in helping identify unnecessary causes of waste so that remedial actions can be taken, performance measurement is not extensively implemented because of the inadequacy of measures, complexity of measurement, time consuming and costly nature of performance measurement, and project-oriented nature of the industry. Where performance measurement is implemented, various frameworks are available, some targeting project performance whilst others focus on overall business performance.

Construction has emerged among the top performing sectors in the period alongside financial services and transport and communication. The sector contributed Sh12.6 billion to the GDP in the period supported by the massive road infrastructure projects currently in progress across the country (Waithaka,2011). Public entities, private firms and individuals continuously engage in acquiring physical assets in different forms such as commercial buildings, residential buildings, schools, hospitals, development infrastructure like roads, water dams, telecommunication and electricity. These projects involve major capital investments driven by market demand or perceived needs. To remain competitive in either profit or non-profit engagements, you need to focus on procedures that offer competitive advantage and value. You need to understand the needs of the customer and correctly deploy the available resources in meetings the expectations of the client by maintaining a competitive edge over your competitors. For residential houses, a Kenyan family will value the luxury of privacy and safety. Time and cost overruns on infrastructure development projects during implementation continue to pose great challenges to developing countries (Kigari & wainaina, n.d).

Ideally, projects designed and managed by highly trained construction professionals and executed by qualified contractors selected on the basis of their capability should meet the project performance goals. These goals are in terms of the contract period, budget, quality, environmental sustainability and client satisfaction. However, there is evidence that despite the high quality of training of consultants in the building industry in Kenya and regulation of the industry in major urban areas, construction projects do not always meet their goals. This is manifested by myriad projects that have cost overrun, delayed completion period and poor quality resulting to collapsed buildings in various parts of the country, high maintenance costs, dissatisfied clients and even buildings which are not functional (Kibuchi&Muchungu, 2012).

## 1.2. Statement of the Problem

Kenya as a country has witnessed a substantial increase in the number of stalled projects due to inappropriate project organization structures and ineffective leadership. There is evidence that the performance of the construction in Kenya is poor as time and cost performance of projects are to the extent that over 70% of the projects initiated are likely to escalate with time with a magnitude of over 50% and over 50% of the projects likely to escalate in cost with a magnitude of over 20% (Nyangilo, 2012).

Kibuchi andMuchungu (2012) discovered that despite the high quality of training of consultants in the building industry in Kenya and regulation of the industry in major urban areas, construction projects do not always meet their goals. This is manifested by myriad projects that have cost overrun, delayed completion period and poor quality resulting to collapsed buildings in various parts of the country, high maintenance costs, dissatisfied clients and even buildings which are not functional.

Previous studies: Nyangilo, 2012; Lepartobiko, 2012; Kibuchi&Muchungu, 2012; Takim&Akintoye, 2002; Mhando & Mrema, 2005, indicate that the failure of any project is mainly related to the problems and failure in performance. Generally, past industry experiences show that, medium to large size projects have high failure rate. The consequences can be costly and lengthy, with the worst outcomes often leading to undesirable litigation engagements. Developing Countries have higher rate of low project performance than developed countries (Lepartobiko, 2012).

This research therefore, investigated the factors affecting the performance of construction projects in Kenya in order to assist owners, consultants and contractors to overcome performance problem and to improve performance of their construction projects. Hence, performance of any construction projects can be evaluated according to key performance indicators.

*1.3. Objectives*

1.3.1. General Objective
The objective of this research was to investigate the factors affecting the performance ofconstruction projects in Kenya,a surveyoflow-rise buildings in Nairobi Central Business District.

1.3.2. Specific Objectives
- To determine the influence of cost of materials on the performance of construction projects in Kenya.
- To establish the influence of quality management on the performance of construction projects in Kenya.
- To examine the influence of time management on performance of construction projects in Kenya.
- To establish the influence of leadership style on performance of construction projects in Kenya.

*1.4. Research Questions*
- Does cost of material influence the performance of construction projects in Kenya?
- To what extent does quality managementinfluence the performance of construction projects in Kenya?
- How does time management influence the performance of construction projects in Kenya?
- What effect does the leadershipstyle have on the performance of construction projects in Kenya?

*1.5. Significant of the Study*
Construction industry contains large number of parties as clients, contractors, consultants, stakeholders, shareholders, regulators and others. Construction projects in Kenyasuffer from many problems and complex issues in performance because of many reasons and factors. This research was very important to investigate the main factors affecting the performance of construction projects. The practices concerned with the KPIs such as time, cost, quality and leadership styles was analyzed in order to know the main practical problems of project performance in Kenyaand then formulated recommendations to improve performance of construction projects in Kenya.
Because of performance problem in Kenya as shown previously and because previous studies in Nairobi CBD about this topic do not deal with all aspects of construction project performance; this study was required and very important to be considered. In this study, it was studied the factors affecting the performance of construction projects in Kenya. These factors can be said as key performance indicators (KPIs). These KPIs can be used to measure performance in construction projects and can then be used for benchmarking purposes. This will be a key component of any organization move towards achieving best practice in order to overcome performance problem in Nairobi CBD.

*1.6. Scope of the study*
The study focused on selected low-rise building construction projects situated in Nairobi Central Business District. Other buildings were left out because it could have been uneconomical to study all buildings locate in Nairobi CBD.Nairobi Central Business District was selected for this study because it is an area in Nairobi County where massive construction is being experienced. The study examined the cost of materials, quality management, time management and leadership style as the independent variable and performance of a construction project as the dependent variable.

*1.7. Limitations of the Study*
Inadequate previous information on the factors affecting the performance of construction projects for comparison purposes as well as the twenty two building sample size may not be a good ground for extrapolation or generalization of a study finding.

**2. Literature Review**

2.1. Introduction
This chapter presents a critical review of the research work that was done by various scholars in the field of performance of construction project. This includes theoretical review, conceptual frame work, empirical review and critique of the existing literature relevant to the study, summary and research gaps.

*2.2. Theoretical framework*

2.2.1. McGregor's Theory of X and Y
Douglas McGregor states that people inside an organization can be managed in two ways. The first is which falls under the category negative and the other one is positive.
Under the assumptions of category negative, employees inherently do not like work and whenever possible, will attempt to avoid it. Because employees dislike work, they have to be forced, coerced or   threatened with punishment to achieve goals. Employees

avoid responsibilities and do not work until formal directions are issued. Most workers place a greater importance on security over all other factors and display little ambition.

Under the assumptions of category positive,physical and mental effort at work is as natural as rest or play. People do exercise self-control and self-direction and if they are committed to those goals. Average human beings are willing to take responsibility and exercise imagination, ingenuity and creativity in solving the problems of the organization. An organization that is run on category negative lines tends to be authoritarian in nature.   In contrast, category positive organizations can be described as participative, where the aims of the organization and of the individuals in it are integrated; individuals can achieve their own goals best by directing their efforts towards the success of the organization.

2.2.2. Critical Chain Project Management Theory
Critical Chain Project Management is the Theory of Constraints logistical application for project operations.  It is named after the essential element; the longest chain of dependent resourced tasks in the project.  The aim of the solution is to protect the duration of the project, and therefore completion date, against the effects of individual task structural and resource dependency, variation, and uncertainty.  The outcome is a robust and dependable approach that will allow us to complete projects on-time, every time, and most importantly within at most 75% of the current duration for single projects and considerably less for individual projects within multi-project environments. The shorter duration provides a sterling opportunity in the marketplace to differentiate ourselves from our competitors who deliver poorer outcomes, and late at that, via other project management methods.  It also offers the opportunity to deliver more projects over all, in the same amount of time, and at no increase in operating expense, thus significantly improving the bottom line (Youngman, 2009).

2.2.3. The Theory of Performance (ToP)
The Theory of Performance (ToP) develops and relates six foundational concepts to form a framework that can be used to explain performance as well as performance improvements. To perform is to produce valued results. A performer can be an individual or a group of people engaging in a collaborative effort. Developing performance is a journey, and level of performance describes location in the journey. Current level of performance depends holistically on 6 components: context, level of knowledge, levels of skills, level of identity, personal factors, and fixed factors. Three axioms are proposed for effective performance improvements. These involve a performer's mindset, immersion in an enriching environment, and engagement in reflective practice.

 Performance advancing through levels is shown in figure 1where the labels "Level 1," "Level 2," etc. are used to characterize effectiveness of performance. That is, a person or organization at Level 3 is performing better than a person or organization at Level 2. As shown on the right side of figure 1, performing at a higher level produces results that can be classified into categories: (i) quality increases—results or products are more effective in meeting or exceeding the expectations of stakeholdersproduce a result goes down; amount of waste goes down, (ii)capability increases—ability to tackle more challenging performances or projects increases,(iii) capacity increases—ability to generate more throughput increases, (iv) knowledge increases—depth and breadth of knowledge increases,(v) skills increase—abilities to set goals persist, maintain a positive outlook, etc. increase in breadth of application and in effectiveness and(vi) identity and motivation increases—individuals develop more sense of who they are as professionals; organizations develop their essence
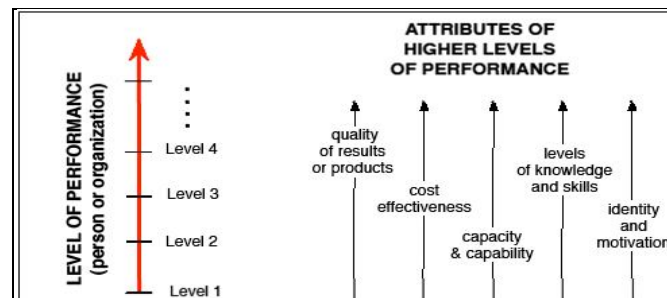


*Figure 1: performance advancing through levels (Elger, 2008)*

*2.3. Conceptual Framework*
A conceptual framework is defined as a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Ramey &Reichel, 1987). The conceptual framework in this study was used to show various variables that affect the performance of construction projects. The research studied a few selected variables based on their importance on performance of construction projects in Nairobi Central Business District. The selected variables were: cost of materials, quality management, time management and leadership style. These variables affect the performance of construction projects as shown in figure 2 below.
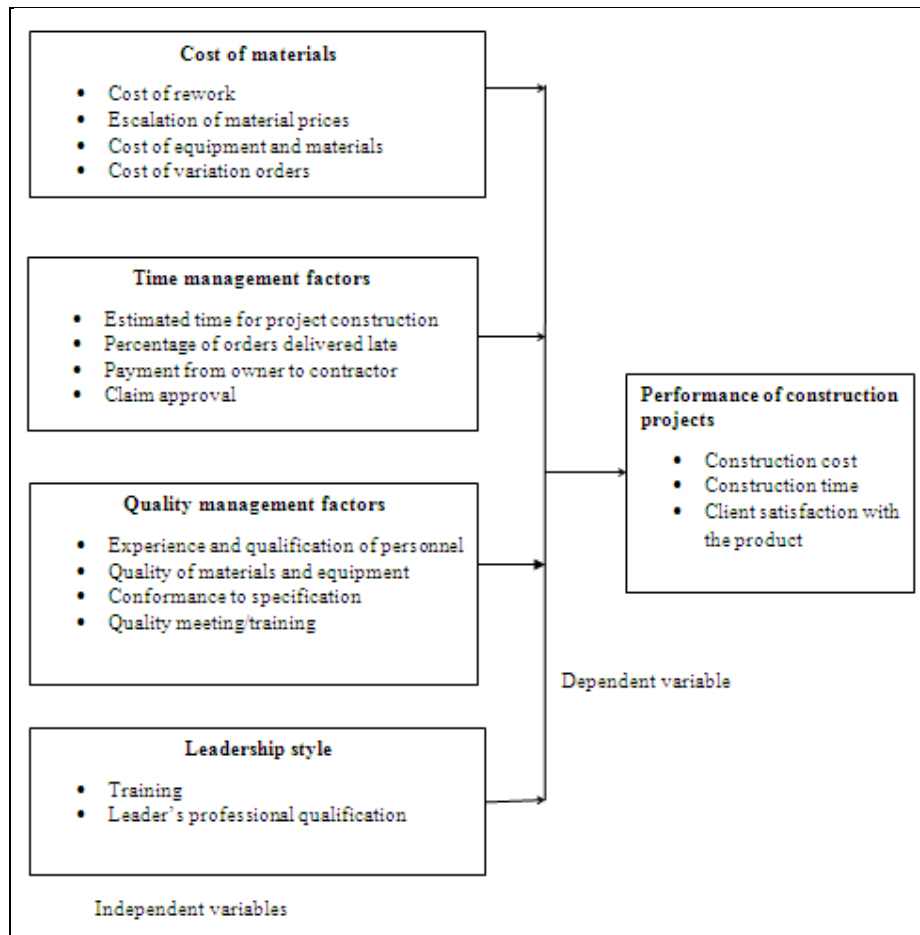
*Figure 2: Conceptual Framework*

2.3.1. Cost of Materials Factors

Curt (2005) argued that the cost management system tracks currentspending and commitments and predicts ultimatecost outcome. Yafiah (2013) indicate that procurement selection criteria of cost, time, quality, project characteristics and external environmental factors have effects on project performance. Fetene(2008) found that the most common effects of cost overrun were delay, supplementary agreement, adversarial relations among stakeholders, and budget shortfall of project owners which guides efforts to improve the performance of the construction industry in the future.

Aftab, Rahman, Abdullah and Azis (2010) stated that fluctuation in price of material, cash flow and financial difficulties faced by contractors, shortage of site workers, lack of communication between parties, incorrect planning and scheduling by contractors are most severe factors while frequent design changes and owner interference are least affecting factors on construction cost performance. Amusan (n.d) discovered from the analysis that factors such as contractor's inexperience, inadequate planning, Inflation, incessant variation order, and change in project design were critical to causing cost overrun, while project complexity, shortening of project period and fraudulent practices are also responsible.

Baloyi and Bekker (2011) discovered that the increase in material cost is the single largest contributor to cost overruns for both global and stadia projects. Mrema and mhando (2005) found that in most cases, malignancy of clients to assume roles of their consultants through making decisions and changes that affect the design and the project cost has undermined the efforts to attain the intended goals. Shaban (2008) stated that the most importantfactors affecting the performance of construction projects agreed by the owners, consultants and contractors were: average delay because of closures and materials shortage; availability of resources as planned through project duration; leadership skills for project manager; escalation of material prices; availability of personals with high experience and qualification; and quality ofequipment and raw materials in project.

2.3.2. Quality Management Factors

Curt, (2005) stated that the quality management system monitors andanalyzes quality of the constructed product andpredicts quality problems and issues. Typical qualitymeasures include:

(i) Quality control (QC) tests: number performed, frequency and percentage passed/failed, number of non-conformance issues, number of change requests and root causes, cost of rework, number of exceptions at turnover and cost of quality (ii) Quality Assurance (QA) Cost (cost of resources): QA cost as a percentage of constructioncost, Cost of Quality (QA Cost + Cost of

Rework) and Cost of Quality as percentage of construction cost.Lepartobiko (2012) stated that quality can be assured by identifying and eliminating the factors that cause poor project performance.

Jha&Jha (2006) found that the project manager's competence and top management support are found to contribute significantly in enhancing the quality performance of a construction project. Lack of contractor experienced topped the quality related cause of project failure. Ling and Bui (2010) discovered that major enablers that lead to project success are foreign experts' involvement in the project, government officials inspecting the project, and very close supervision when new construction techniques are employed. A factor which leads to poor performance is the lack of accurate data on soil, weather, and traffic conditions.

### 2.3.3. Time Management Factors

Time is money to owners, builders, and users of the constructed facility. From the owner's perspective there is lost revenue by not receiving return on investment, cash flowcrunch, potential alienation and loss of clients/tenants, extended interest payments, andnegative marketing impacts. From the users' perspective, there are financial implications similar to owners (Bob & Muir, 2005).

Aje, Odusami andOgunsemi (2009) showed that contractors' management capability has significant impact on cost and time performance of building projects. Wiguna and Scott (2005) showed the critical risks affecting both project time and cost perceived by the building contractors were similar. They were: high inflation/increased material price, design change by owner, defective design, weather conditions, delayed payments on contracts and defective construction work. With respect to time delays the most significant contributing factor for global projects was late delay in payments while for the stadia projects design-related factors caused the most delays (Baloyi&Bekker, 2011).Iyagba (2010) identified the factors that contribute substantial detrimental effect to project performance, thus affecting the integrity of the construction industry.

### 2.3.4. Leadership Style

There was significant relationship between the project leader's professional qualification, his leadership style, team composition and overall project performance (Odusami, Iyagba & Omirin, 2003). Leadership must be raised from among the Hispanic workers to aid in effectively coordinating work activities by providing the communication link between management andwork crews. This provides the opportunity for upward mobility and gives motivated individuals the chance to advance professionally (Bob &Muir, 2005). Lack of appropriate project organization structures, poor management systems and leadership are the major causes of poor project performance (Nyangilo, 2012). Nyangilo argued that the project leaders are endowed with technical skill but lack the other basic project management skills of dealing with the human, culture and environmental sides of the project.

Various statistical configurations have also been identified, indicating possible weaknesses within the team dynamic that may be addressed in an effort to achieve improved project performance (Langford & Tennant, 2005). Kamalesh, Rizwan and Syed (2002) collected data through selected project managers and construction professionals working in managerial capacity in South Florida, it was found that the leadership style exhibited is both high task and high employee relationship; which is the selling type. They found that there is no significant difference in the leadership orientation of well experienced managers and less experienced managers. Gbadura and Oke (2010) recommend democratic and transformational leadership styles for Nigerian quantity surveyors in discharging their duties as construction projects managers.

### 2.3.5. Performance of Construction Projects

To perform is to take a complex series of actions that integrate skills and knowledge to produce a valuable result (Elger, 2008).Project performance has been defined as the degree of achievement of certain effort or undertaking which relates to the prescribed goals or objectives that form the project parameters (Ahmad, Ismail, Nasid, Rosli, Wan &Zainab, 2009).  The key requirements of suitable performance measures and measurement frameworks are identified as including, having a few but relevant measures, being linked with critical project objectives, providing accurate information, and comprising financial and non-financial measures (Ankrah& Proverbs, 2005).

There are many potential measures of performance for evaluating the success of a construction project. All address performance in three key areas: scope, schedule and budget (Alvarado, Silverman & Wilson, 2005). Akintoye and Takim(2002) discovered seven project performance indicators, namely: construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service; and three company performance indicators, namely: safety, profitability and productivity.

### 2.4. Empirical Review

Shaban (2008) in his thesis on factors affecting the performance of construction projects in the Gaza Strip, found out that the most importantfactors agreed by the owners, consultants and contractors were: average delay becauseof closures and materials shortage; availability of resources as planned throughproject duration; leadership skills for project manager; escalation of material prices;availability of personals with high experience and qualification; and quality of equipment and raw materials in project. Bui and Ling, (2010) in the study that was carried out in Vietnam on factors affecting construction project outcomes discovered that major enablers that lead to project success are foreign experts' involvement in the project, government officials inspecting the project, and very close supervision when new construction techniques are employed. A factor which leads to poor performance is the lack of accurate data on soil, weather, and traffic conditions.

Kigari and Wainaina, (n.d) in a journal of emerging trends in economics and management sciences time and cost overruns in power projects in Kenyaby closely relating the factors to the various variables, it was observed that they resulted to overrun on the projects by varying magnitudes. The Projects had time overruns ranging from –4.6% to 53.4 %, while the cost overruns varied

between 9.4% and 29%. Amusan, (n.d) studied factors affecting construction cost performance in Nigerian construction sites. It was discovered from the analysis that factors such as contractor's inexperience, inadequate planning, Inflation, incessant variation order, and change in project design were critical to causing cost overrun, while project complexity, shortening of project period and fraudulent practices are also responsible.

Fetene, (2008) did a study on causes and effects of cost overrun on public building construction projects in Ethiopia. From the results it was found that 67 out of 70 public building construction projects suffered cost overrun. The rate of cost overrun ranges from a minimum of 0% to the maximum of 126% of the contract amount for individual projects.

Iyer and Jha (2006) did a research on factors affecting cost performance evidence from Indian construction projects and found out that the project manager's competence and top management support are found to contribute significantly in enhancing the quality performance of a construction project.

Nyangilo, (2012) did an assessment of the organization structure and leadership effects on construction projects' performance in Kenya, he found out that lack of appropriate project organization structures, poor management systems and leadership are the major causes of poor project performance.  Gbadura and Oke, (2010) examined project management leadership styles of Nigerian quantity surveyors, on the general note, Nigerian quantity surveyors were found to be autocratic using Jerrell/Slevin measuring instrument while in the opinion of Nigerian construction professionals; they are more of task oriented in discharging their duties as construction project managers.Iyagba, OdusamiandOmirin, (2003) did a research on the relationship between project leadership, team composition and construction project performance in Nigeria. The tests of the hypotheses led to the conclusion that there was significant relationship between the project leader's professional qualification, his leadership style, team composition and overall project performance. No significant relationship was found between the project leader's profession and overall project performance.

### 2.5. Critique of the Existing Literature Relevant to the Study

Nyangilo (2012) did a research on an assessment of the organization structure and leadership effects on construction projects' performance in Kenya. Lepartobiko (2012) studied the factors that influence success in large construction projects. Kigari and Wainaina, (n.d) studied emerging trends in economics and management sciences time and cost overruns in power projects in Kenya by closely relating the factors to the various variables. Based on local studies that have been done in Kenya; most of them did not focus on key performance indicators of construction projects in Kenya. From these studies there is no a guideline for the contractors who want to correct their previous mistakes and improve on their current situation. Therefore, this research focused on key performance indicators of construction projects in Nairobi Central Business District which shall be used as a benchmarking for the contractors.

### 2.6. Research Gaps

Kibuchi and Muchungu (2012) studied the contribution of human factors in the performance of construction projects in Kenya. Nyangilo (2012) did a research on an assessment of the organization structure and leadership effects on construction projects' performance in Kenya. Lepartobiko (2012) studied the factors that influence success in large construction projects. From these studies that have been done on performance of construction projects, there is a need for future studies to focus on the following areas: The effects of construction project manager's skills on projects performance.Find out between public and private construction projects, which one has got higher performance level. It is also recommended to develop performance measurement framework and modeling system in order to measure performance of construction organizations and projects. In addition, it is recommended to study and evaluate the most important factors as a case study of construction projects in Nairobi.

### 2.7. Summary

According to previous studies, it could be said that the performance measurement is a process that include factors as Key Performance Indicators (KPIs) such as time, cost, quality, client satisfaction; leadership style and safety in order to enable measurement of current organizational project performance and to achieve significant performance improvements of future projects.

It was obtained that there were many fields and topics which are related to performance such as, construction management, information technology, factors affecting performance of managers, measurement of project performance, key performance indicator and benchmarking.

The key performance indicators are used to evaluate performance of construction projects. These indicators can then be used for benchmarking purposes, and will be as a key component of any organization to move towards achieving best practice and toovercome performance problem in Kenya.

## 3. Research Methodology

### 3.1.Introduction

In this chapter the details of all information regarding the methods that was used to carry out the research, the type of research design that was used, the sample size, sampling techniques, the procedure that was used to obtain samples and the research instrument and method of data collection were discussed. It also indicated how data was analyzed and presented.

*3.2. Research Design*
It is the blueprint for conducting the study that maximizes control over factors that could interfere with the validity of the findings. Designing a study helps the researcher to plan and implement the study in a way that will help the researcher to obtain intended results, thus increasing the chances of obtaining information that could be associated with the real situation (Burns & Grove, 2001).
A quantitative and descriptive approach was adopted to investigate factors affecting the performance of construction projects in Kenya. This was a quantitative study since it quantified data and generalized results from a sample to the population of interest. The study aimed at collecting information from respondents on their views on factors affecting the performance of construction projects in Kenya. This research studied respondent in Nairobi CBD who acted as a representative of the whole country.
A Survey was adopted because it allowed the researcher to collect a large amount of data in a relatively short period of time, it was less expensive than many other data collection techniques, it could be created quickly and administered easily and could be used to collect information on a wide range of things, including personal facts, attitudes, past behaviors and opinions. Surveys are relatively inexpensive (especially self-administered surveys).

*3.3. Population*
Hungler and Polit (1999) refer to the population as an aggregate or totality of all the objects, subjects or members that conform to a set of specifications. In this study the target population was the building construction projectsin Kenya. The study population was contractors who were involved in constructing the buildings.

*3.4. Sampling Frame*
The list of low-rise buildings in Nairobi CBD was obtained from Ministry of Public Works. There are 32 low-rise buildings in Nairobi CBD.

*3.5. Sample And Sampling Technique*
The process of selecting a number of individuals or objects from a population such that the selected group contains elements representative of the characteristics found in the entire groupis known as sampling (Kombo&Orodho, 2002). Time and money was saved by selecting a sample study rather than attempting to study the entire population of buildings. Obtaining data from the population of contractors as well as analyzing and interpreting vast amounts of data would have been impossible to accomplish within the time constraints and with the limited financial resources which were available for conducting this research.
A probability sampling design was adopted which, according to Kombo & Orodho (2002), samples are selected in such a way that each item or person in the population has a known likelihood of being included in the sample. Simple random sampling was used as it was easy to implement with automatic dialing and computerized voice response system, the sample yield research data that could be generalized to a larger population, it permitted the researcher to apply inferential statistics to the data and provided equal opportunity of selection for each element of the population (Kombo&Orodho, 2002).
A sample is a subset of a population selected to participate in the study, it is a fraction of the whole, selected to participate in the research project (Kombo&Orodho, 2002). In this research, a subset of 22 respondents was selected out of the entire population of 32. Sample size was found as follows. $n = n'/[1+ (n'/N)]$
Where:
N = total number of population
n= sample size from finite population
n' = sample size from infinite population = $S^2/V^2$; where S2 is the variance of thepopulation elements and V is a standard error of sampling population. (Usually S= 0.5 and V = 0.06).

*3.6. Instrument*
Questionnaires were used to gather data because the information could be collected from a large sample and diverse regions, confidentiality was upheld and saved on time. The study usedthe data sources to produce the following basic documents: respondents' documents and archival documents. The respondents' documents werecollected using questionnaires from contractors.
There were two basic types of survey questions from which to choose: open-ended and closed-ended. This questionnaire survey had both open-ended and closed-ended questions. Archival documents were mostly from completed projects, in which contract documents, project reports, correspondence letters and payment certificates were investigated thoroughly which were very important in identifying the factors affecting the performance of construction projects.

*3.7. Data Collection Procedure*
The data was collected by the researcher who distributed the formulated questionnaires to the respondents. Twenty two questionnaires were distributed to the responded randomly and the researcher was involved in filling the questionnaires. The researcher then collected the questionnaires for data analysis and presentation.

*3.8. Pilot Test*
Pilot study of the questionnaire is achieved by a scouting sample, which consisted of 7 questionnaires that is, 20 percent of the population. These questionnaires were distributed to expert engineers such as projects managers, site engineers/office engineers and organizations managers. They have a strong practical experience in construction industries field. Their sufficient experiences

were suitable indication for pilot study. The data gathered through the pilot studyprovided related information about the factors affecting the performance of building construction projects in Nairobi Central Business District.

Validity refers to the degree to which an instrument measures what it is supposed to measure (Hungler and Pilot, 1999). This section presents test of validity of questionnaire according to the pilot study. Statistical validity is used to evaluate instrument validity, which include criterion-related validity and construct validity.

The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measuring (Hunger &Polit, 1999). This section presents test of reliability of questionnaire according to the pilot study. The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool.

### 3.9. Data Analysis and Presentation

The process of data analysis involved first cleaning and editing to exclude irrelevant materials to the study. Data was then organized into the four objectives of the study. A coding scheme was developed and data imputed into the Statistical Package for Social Scientists (SPSS) for descriptive statistical analysis. Code 1 was assigned to the lowest level of agreement while code 5 was assigned to the highest level of agreement with the respective statement.

The descriptive analysis and statistical calculation was done in order to interpret raw data into useful information to stakeholders. Descriptive data was analyzed using frequencies, percentages and measures of central tendency to find the views of the respondents on performance of construction projects. Simple linear regression was used to test the relationship between the independent variables and dependent variable. This was done using SPSS toolset. The result of the analysis was presented in tables and pie charts.

Qualitative content analysis was doneby coding raw messages (that is, textual materials) according to a classification scheme. Once identified, the qualitative analysis was used to examine latent or inferred meanings of the communication under the study, which led to the development of constructs or theories based on the researcher's knowledge and evidence drawn from the study.

## 4. Research Findings and Discussions

### 4.1. Introduction

This chapter presents the analysis of data, interpretations, and findings of the research. Analysis is done using statistical package for social sciences (SPSS) linear regression analysis and descriptive analysis for the variables. Results of the analysis are then presented through tables and figures.

### 4.2. Response Rate

A total of 22 questionnaires were sent to the construction firms that were involved in construction of building projects. Each construction firm chose a representative who had full knowledge of the firm to represent it in filling in questionnaires. After the data had been collected, 22 out of the targeted 22 questionnaires were responded to; therefore, 22 questionnaires were used in the analysis. This represented a 100% response rate. This is a good response rate since according to Dawson-Saunders (1994), a good response rate ensures that the research is free from sampling bias which is an important indicator of a research quality observes that higher response rates assure more accurate research results.

### 4.3. Findings

4.3.1. Part One: General Information

The study founded out that there are various positions held in the construction firms and those who were well conversant with the firm represented the firm. According to the study, there were 31.8% project managers, 36.4% site engineers, 18.2% organization managers and 9.1% others who were involved in answering the questionnaire. This shows that everybody in the construction firm had the opportunity to respond to the questionnaire.

Table 1 shows the frequency and percent of job title of the respondent in the respective firms:

| Job title of the respondent | Frequency | Percent |
|---|---|---|
| Project Manager/deputy | 7 | 31.8 |
| Site Engineer | 8 | 36.4 |
| Organization Manager | 4 | 18.2 |
| Others | 2 | 9.1 |
| Total | 21 | 95.5 |
| Total | 22 | 100.0 |

Table 1: Frequency and percent of job title of the respondent

The study also showed that various firms had experience of years ranging from 2 to 33 years. This is an indication that there are new and old firms in the industry who may have influence on project performance. The firm had the number of employee of between 10 and 100.

4.3.2. Value of Projects Executed in the Last Five Years: (In Million Dollars)

The study sought to establish the value of construction projects executed in the last five years. From the results, 95.45% 0f the respondent had executed projects of value greater than 20 million dollars and only 4.55% executed projects of value less than 20 million dollars. Hence the respondents that were involved in this study were those that executes project of high value. The results are as shown in the figure 3 below.
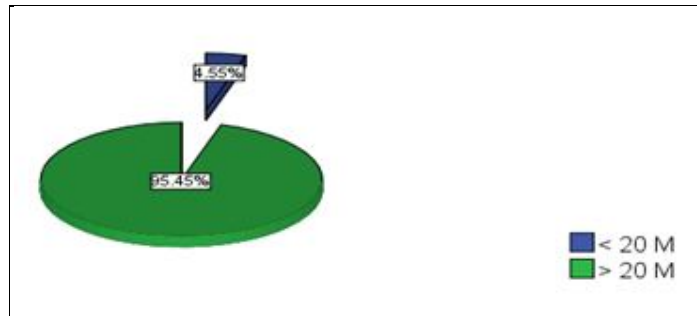


*Figure 3: Percent of value of projects execute*

*4.4. The Performance of Construction Projects*

4.4.1. Construction projects executed in the last five years

The respondents were asked to indicate the range of construction projects executed in the last five years. Most of the respondent had executed less than 10 projects in the last five years. The result showed that 40.9% had executed less than 10 projects, 13.6% had executed between 11 and 20 projects, 18.2% had executed between 21 and 30 projects and 27.3% had executed more than 30 projects. The results are as shown in the table 2 below,

| Projects | Frequency | Percent |
|---|---|---|
| < 10 | 9 | 40.9 |
| 11-20 | 3 | 13.6 |
| 21-30 | 4 | 18.2 |
| >30 | 6 | 27.3 |
| Total | 22 | 100.0 |

*Table 2: Frequency and percent ofconstruction projects executed in the last 5 years*

4.4.2. Construction Projects Executed that had a Cost Overrun:

The respondents were called upon to state among the projects that they executed whether they had a cost overrun or not. It was discovered that a number of construction projects had a cost overrun since 68.2% of less than10 projects executed had a cost overrun, 18.2% of 11 to 20 executed projects had a cost overrun, 9.1% of 21 to 30 projects had a cost overrun and 4.5% of more than 30 projects had a cost overrun. This reflects what Fetene, (2008) discovered that 67 out of 70 public building construction projects suffered cost overrun. See the results in the table 3 below,

| Project | Frequency | Percent |
|---|---|---|
| <10 | 15 | 68.2 |
| 11-20 | 4 | 18.2 |
| 21-30 | 2 | 9.1 |
| >30 | 1 | 4.5 |
| Total | 22 | 100.0 |

*Table 3: Frequency and percent ofconstruction projects executed that had a cost overrun*

4.4.3. Percentage of Cost Overrun for the Executed Projects

To establish by which percentage did the executed project had cost overrun, the study sought to find out the percentages of cost overrun. It was discovered that 40.91% had a cost overrun of about 20%, 54.55% had a cost overrun of between 21 and 50% and 4.55% had a cost overrun of more than 50%. This can be seen from what Fetene, (2008) found out that the rate of cost overrun ranges from a minimum of 0% to the maximum of 126% of the contract amount for individual projects. The results are as shown in the figure 4 below,
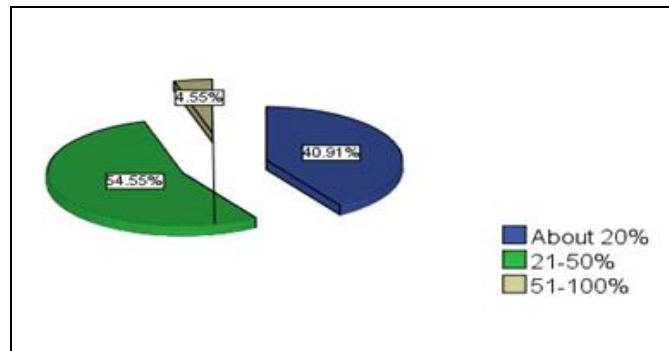
*Figure 4:Percentage of cost overrun for the executed projects*

4.4.4. Construction Projects Executed that were Completed on Time:
In attempt to find out whether the construction projects were completed on time or not, the study sought to establish how many construction projects were completed in time out of those executed. The result shows a high percentage of delayed projects since 68.2% of less than 10 projects were completed on time, 22.7% of projects between 11 and 20 were completed on time, and 4.5% of projects between 21 and 30 were completed in time while 4.5% of projects more than 30 were completed on time. This shows that most construction projects are delayed in time as indicated by Kigari&Wainaina, (n.d) observed that time and cost overruns in projects resulted to overruns on the projects by varying magnitudes. The Projects had time overruns ranging from –4.6% to 53.4 %. The results are as shown below,

| Project | Frequency | Percent |
|---------|-----------|---------|
| <10 | 15 | 68.2 |
| 11-20 | 5 | 22.7 |
| 21-30 | 1 | 4.5 |
| >30 | 1 | 4.5 |
| Total | 22 | 100.0 |

*Table 4: Frequency and percent of construction projects executed that were completed on time*

4.4.5. Percentage the Construction Projects Executed that Delayed in Time
When the respondents were asked to state by which percentage were construction executed had a delay in time, they gave their views in that 50% said that executed projects were delayed by about 20%, 36.4% said that projects were delayed by 21% to 50% and 13.6% showed that projects were delayed by more than 50%. There is evidence that construction project have performance problem as it was also discovered byNyangilo, (2012) that the performance of the construction in Kenya is poor as time and cost performance of projects are to the extent that over 70% of the projects initiated are likely to escalate in time with a magnitude of over 50% and over 50% of the projects likely to escalate in cost with a magnitude of over 20%. See the result in the figure 5 below;
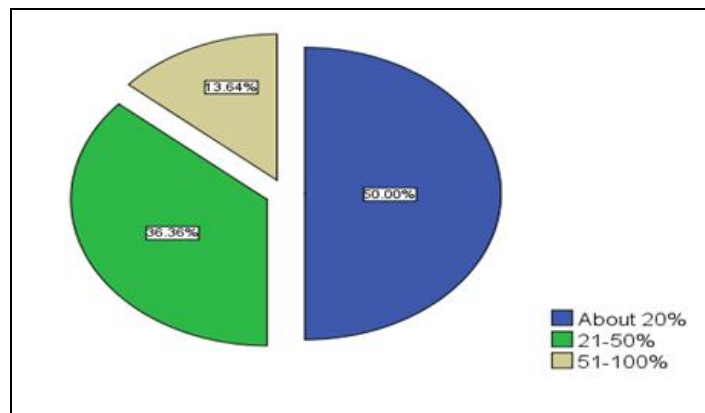


*Figure 5: Construction projects executed that were delayed in time*

4.4.5. Client Satisfaction with the Projects
Client satisfaction with the project was established through asking the respondents whether the client was satisfied with the project they executed as a measure of project performance. It was discovered that 40.9% stated that their project always satisfied the client, a bigger percentage of 54.5% stated that the projects sometimes satisfied the client while 4.5% said that the client was not satisfied at all the project. A high percentage shows discrepancy in client satisfaction with the project which indicate that the performance of construction project has problems. The result is as shown below in the figure 6 below,
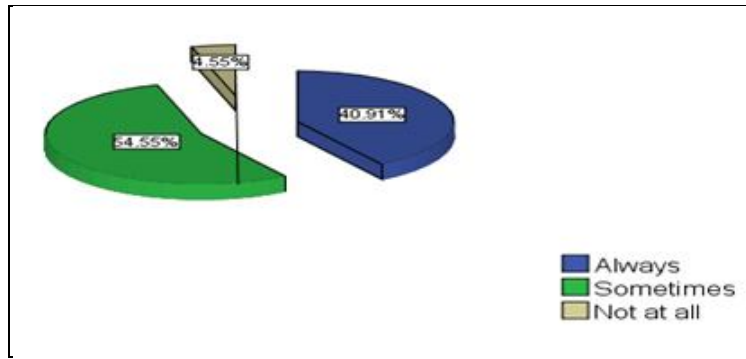
*Figure 6: Client satisfaction with the projects*

*4.5. Practices concerning with the Factors Affecting the Performance of Construction Projects in Kenya*

4.5.1.The Cost of Materials
In order to establish the influence of cost of materials on the performance of construction projects, the respondent was asked to show the influence of cost of materials on the performance of construction projects. A higher percentage of 68.2 indicated that they purchase construction materials always when they are required. 81.8% stated that they apply current quotation materials and equipment cost record in estimating the construction cost of the project. See the appendix table 1.1 to 1.4

 4.5.2. Opinion on whether the cost of equipment and material affects the performance of construction projects
The respondents were asked their opinion whether the cost of equipment and materials had influence on the performance of construction projects. 72.7% agreed that cost of equipment and materials affect the performance of construction projects, 13.6% were undecided while 13.6% disagreed with the opinion. The result indicates that indeed cost of material and equipment is a cost factor that affect the performance of construction projects. This confirms with Baloyi and Bekker (2011) who discovered that the increase in material cost is the single largest contributor to cost overruns for both global and stadia projects. The findings are as shown in the figure below,
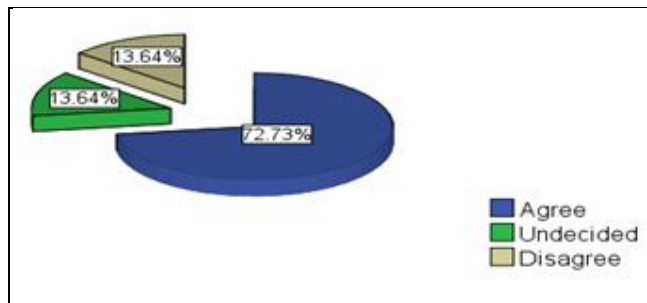


*Figure 7: Percentage of cost of equipment and materials*

4.5.3. Opinion on whether cost of variation order had influence on performance
 The study also sought to determine the influence of cost of variation order on the performance of construction project, 90.9% of the respondent agreed that cost of variation orders affect the performance of projects while 9.1% disagreed with the opinion that cost of variation orders affects the performance of construction project. This is a clear indication that cost of variation orders affects the performance of construction project as seen from Amusan (n.d) who found out those factors such as contractor's inexperience, inadequate planning, Inflation, incessant variation order, and change in project design were critical to causing cost overrun. The results are shown below in the diagram,
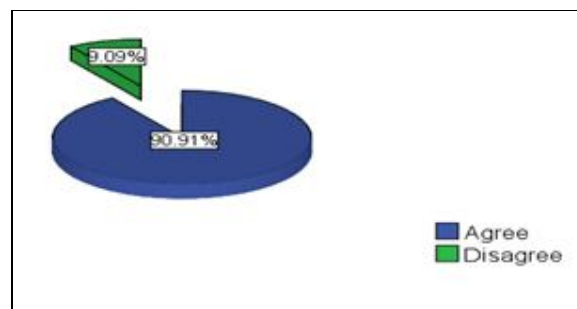


*Figure 8: percentage of cost of variation orders*

4.5.4. Opinion on whether cost of rework affects the influence on performance

When the respondents were asked whether cost of rework affect the performance of construction projects, 77.3% agreed that cost of rework affects the performance of construction project, 13.6% were undecided on whether the cost of material affect the performance of construction project while 9.1% disagreed that cost of rework affect the performance of construction projects. From this result, it shows that cost of rework is a factor that affects the performance of construction project but it may not be a major factor as some of the respondent disagreed that cost of rework affects the performance of construction projects. This result reflects what Curt (2005) argued that the cost management system tracks current spending and commitments and predicts ultimate cost outcome. The findings are as shown in the figure below,
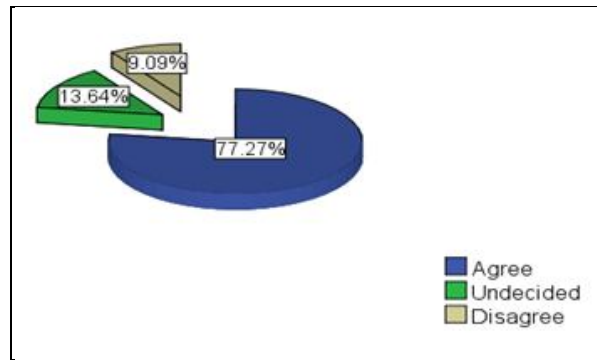


*Figure 9: Percentage of cost of rework*

4.5.5. Opinion on the influence of escalation of price on performance

The study sought to determine the respondent's opinion on the influence of escalation of prices on the performance of construction project. Escalation of material prices is a cost of material factor that affect the performance since 95.5% agreed that escalation of material prices affect the performance of construction projects while 4.5% disagreed that escalation of material prices affect the performance of construction projects. This is the case as Shaban (2008) stated that the most important factors affecting the performance of construction projects agreed by the owners, consultants and contractors were: average delay because of closures and materials shortage; availability of resources as planned through project duration; leadership skills for project manager; escalation of material prices; availability of personals with high experience and qualification; and quality of equipment and raw materials in project. The results are as shown below,
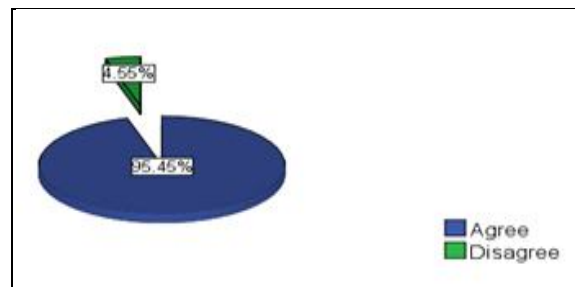


*Figure 10: Percentage of escalation of material prices*

*4.6. Time Management Practices*

Time as a factor that influence the performance of construction project was determine through finding out whether the firms participated in pre-project planning, the software that they use in planning, supply of incentive system to stimulate the construction time and opinion on time factors that affect the performance of construction projects. 95.5% accepted that they participated in pre-planning effort while 4.5% rejected that they participate in pre-project planning effort. 45.5% of the respondent used primavera, 22.7% used Microsoft project, 18.2% used excel sheet while 9.1% used others software in planning and scheduling for their projects. On the kind of method the firm used to represent the project planning and scheduling, 13.6% said that they use bar chart, 72.7% said that they used critical path method while 9.1% indicated that they used S-Curve.

To understand how often the contractor required the sub-contractors or supplier to submit their detail activities schedule in advance to enable him adjust actual schedule, only 4.5% required them to submit their detailed activities on a daily basis, 68.2% required the subcontractors to submit on a weekly basis, 22.7% required the subcontractor to submit on a monthly basis while 4.5% did not required them to submit their detailed activities. On how contractor supply incentive to stimulate construction time, 68.2% of the contractors provided bonus in position while 31.8% of the contractors supplied training as incentive to stimulate construction time. See the appendix table 2.1to 2.6

Opinion on time management factors that affect the performance of construction projects

4.6.1. Opinion how estimated time of project affect the performance of construction projects
To establish how time management factors affect the performance of construction projects, the respondent was asked to give his/her opinion on the influence of estimated time for the project on the performance of construction projects. 68.2% of the respondent strongly agreed that estimated time of project affect the performance of construction project, 27.3% moderately agreed while 4.5% strongly disagreed that estimated time for the construction project had influence on the performance of construction projects. From these results, it shows that estimated time for a project is an influence performance but not on all respondents as some moderately agreed with the opinion. The result are shown in the figure below,
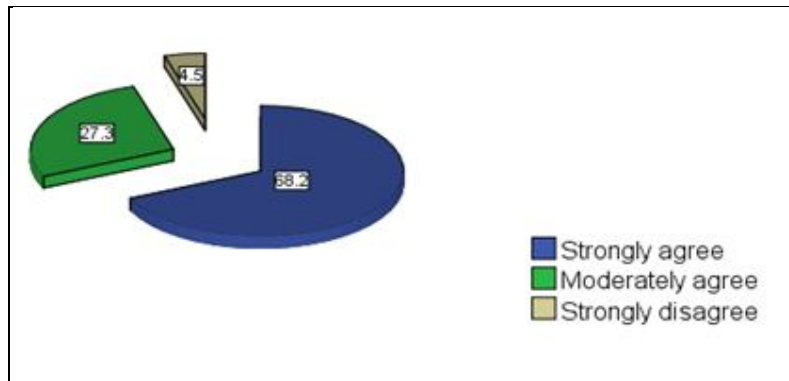


*Figure 11: Percentage of estimated time for project*

4.6.2. Opinion on how percentage orders delivered late affect performance of construction projects
To establish on whether the percentage of order delivered late affect the performance of construction project, 68.18% strongly agreed that percentage of order delivered late affect the performance, 22.73% moderately agreed, 4.55% slightly agree while 4.55% slightly disagree with the opinion. A number of respondents agreed with the opinion indicating that actually if orders are delivered late, it will have impact on the performance of the project.
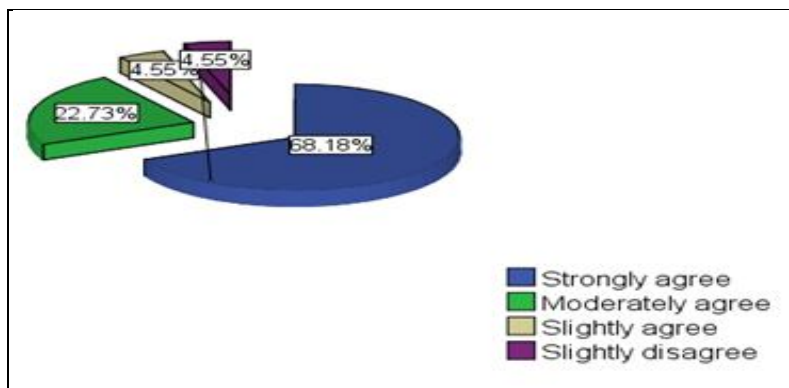


*Figure 12: Percentage of order delivered late*

4.6.3. Opinion how delay in claim approval affect performance of construction projects
The study sought to determine how delay in claim approval affects the performance of construction projects. 64.55% strongly agreed strongly that delay in claim approval affect the performance of construction project, 31.82% moderately agree, 9.09% slightly agree while 4.55% strongly disagree that delay in claim approval affects the performance of construction projects. This is also seen in Aje, Odusami and Ogunsemi (2009) that contractors' management capability has significant impact on cost and time performance of building projects.
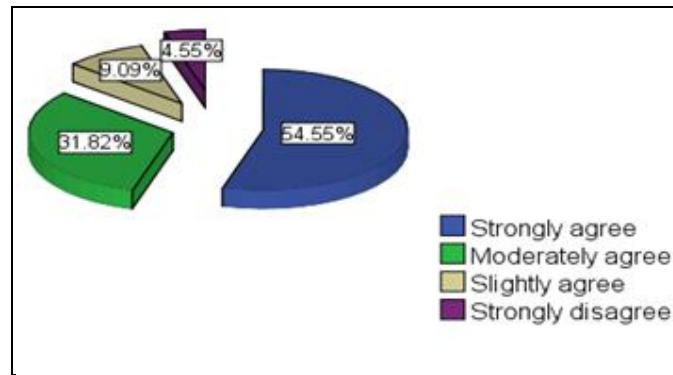
*Figure 13: Percentage of delay in claim approval*

4.6.4. Opinion how delayed payment from owner to contractor affect the performance of construction projects

To establish on whether delayed payment from owner to contractor affect the performance of construction projects, 72.73% strongly agree that delayed payment from the owner to the contractor affect the performance, 13.64% moderately agreed with the opinion, 4.55% slightly agreed while 9.09% strongly agreed that delayed payment affect the performance of construction project. This is a reflect of Baloyi & Bekker (2011) findings that with respect to time delays the most significant contributing factor for global projects was late delay in payments. The result are as shown below,
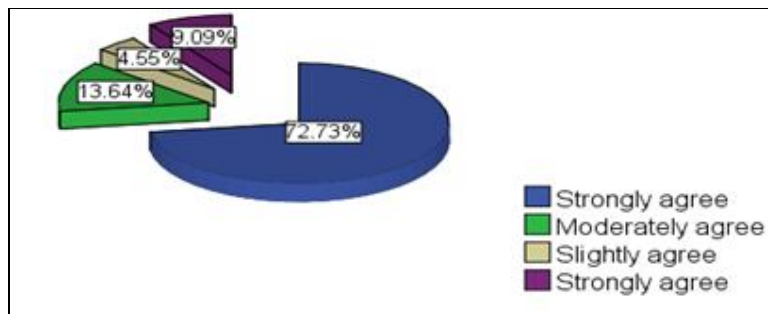


*Figure 14: Percentage of delay in payment*

*4.7. Quality Management Practices*

The study sought to establish the influence of quality management practices on the performance of construction projects. To do this, the contractors were asked if they took their materials for construction to a central laboratory for testing before using them. 95.5% of the contractors took the materials for construction to a central laboratory for testing while 4.5% did not take the materials for testing before using them. To determine whether the contractors conducted a quality training session for the staffs, 9.1% of the contractors conducted a quality training session for the staffs on a weekly basis, 81.8% conducted a training session on monthly basis while 9.1% did not conduct quality training session for the staffs. These results indicate that contractors test materials before using and they conduct quality training sessions for their staffs. Lepartobiko (2012) stated that quality can be assured by identifying and eliminating the factors that cause poor project performance. See the appendix table 3.1 and 3.2

Opinion on quality management factors that affect the performance of construction projects

4.7.1. Opinion how qualification and experience of staffs affect the performance of construction projects

To determine whether the qualification and experience of staffs has influence on performance of construction project, the study required the respondent to express their opinion on whether the qualification of the staff has influence on the performance of construction project. 72.73% strongly agreed that qualification and experience of staff has influence on performance, 22.73% moderately agree while 4.55% disagreed strongly that qualification and experience of a staff has an influence on performance of construction projects. As Jha&Jha (2006) stated that the project manager's competence and top management support are found to contribute significantly in enhancing the quality performance of a construction project. See the results from the figure below,
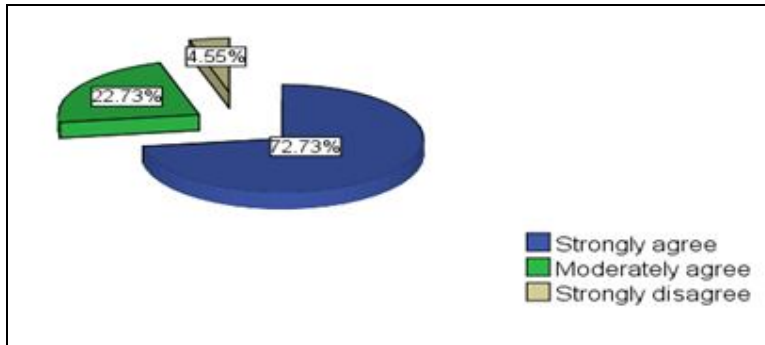
*Figure 15: Percentage of quality and experience of personnel*

4.7.2. Opinion on the influence quality of materials and equipment used affect the performanceof construction projects
The respondents were called upon to express their opinion on whether the quality of materials and equipment used affect the performance of construction projects. 81.82% strongly agreed that the quality of equipment and material used affect the performance of construction projects, 9.09% moderately agreed that quality of equipment and material affect the performance, 4.55% slightly agreed while 4.55% slightly disagreed that quality of equipment and material affect the performance of construction project. This indicates that quality of equipment and materials are a major factor for a contractor who wants to perform well. Contractors should ensure that they use equipment and materials of good quality to achieve better performance in their construction projects. The results are as shown in the figure below,
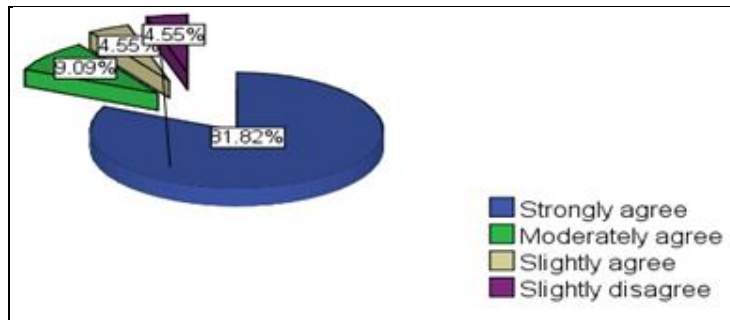


*Figure 16: Percentage of quality of material and equipment*

4.7.3. Opinion on whether conformance to specification has influence on the performance of construction projects
The study sought to establish whether conformance to specification has influence on the performance of construction projects. 86.36% strongly agreed that conformance to specification is an important factor that affects the performance of construction project, 9.09% moderately agreed while 4.55% slightly disagreed that conformance to specification influence the performance of construction projects. This is an indication that for a contractor who wants to perform well has to adhere to specifications because they are determinant of the final quality of the project. As Ling and Bui (2010) indicates that major enablers that lead to project success are foreign experts' involvement in the project, government officials inspecting the project, and very close supervision when new construction techniques are employed. All these actions ensure that the contractor conforms to the specifications. The findings are shown in the figure below,
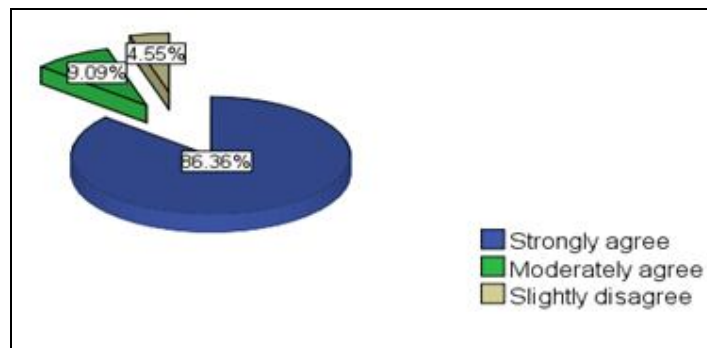


*Figure 17: Percentage of conformance to specification*

4.7.4. Opinion whether quality assurance training and follow up has influence on the performance of construction projects

When the respondent were asked on whether quality assurance training and follow up has influence on performance of construction projects, 77.27% strongly agreed that quality assurance and follow up has influence, 9.09% moderately agreed that quality assurance training and follow up has influence on performance, 9.09% slightly agreed while 4.55% slightly disagreed that quality assurance training and follow up has influence on performance of construction projects. This results shows that contractors should occasionally perform quality assurance training and follow up since a higher percentage of respondent have agreed that quality assurance training and follow up is a factor that affect the performance of construction projects. This is also seen from Kibuchi and Muchungu (2012) that despite the high quality of training of consultants in the building industry in Kenya and regulation of the industry in major urban areas, construction projects do not always meet their goals. The result are shown in the figure below,
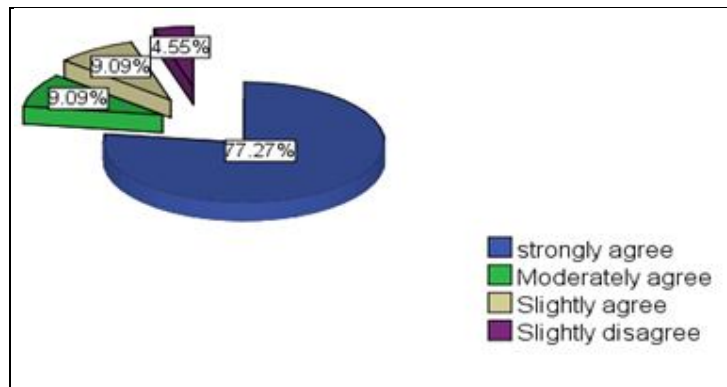


*Figure 18: Percentage of quality assurance training and follow up*

*4.8. Leadership Style*

The study sought to determine the influence of leadership style on performance of construction project. This was done by asking the respondent on basis they used to select the leaders, whether the type of personality determines the style of leadership adopted by the leader and how efficient the staffs performed their cores. Most contractors selected leaders based both on experience and level of education as this accounted for 45.5% of total. A number of the contractors selected based on experience the leader has as this accounted for 40.9% of the total. 27.3% showed that the staffs performed their core faster while 72.7% had opinion that the staffs performed their cores efficiently depending on the type of leadership style adopted on site. Odusami, Iyagba&Omirin (2003) argued that there was significant relationship between the project leader's professional qualification, his leadership style, team composition and overall project performance. See appendix table 4.1to 4.4

Opinion on leadership style practices that affect the performance of construction projects

4.8.1. Opinion how staff training affect the performance of construction projects

The respondent was asked to give their opinion on the influence of staff training on the performance of construction project. 90.91% agreed that actually staff training has influence on the performance of construction projects, 4.55% were undecided on the opinion while 4.55% disagreed that the staff training has influence on the performance. As agued by Nyangilo that the project leaders are endowed with technical skill but lack the other basic project management skills of dealing with the human, culture and environmental sides of the project. Therefore contractors should always ensure that their staffs have the required skills as this influence their performance. The findings are as shown below,
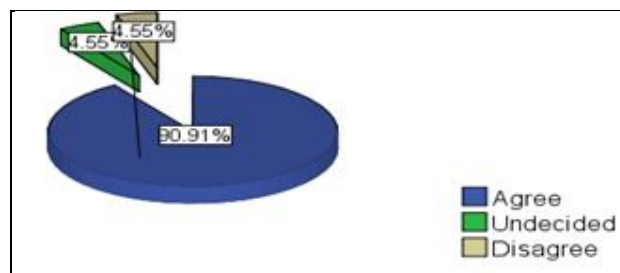


*Figure 19: Percentage on training*

4.8.2. Opinion on the influence of the leader's professional qualification on the performance of construction projects

When respondents were asked whether leader's professional qualification has influence on the performance of construction project, 86.36% agreed that leader's professional qualification has influence on performance, 4.55% were undecided on the opinion while 9.09% disagreed that leader's professional qualification has influence on performance of construction projects. This shows that as much as contractors select leaders based on experience they should as consider the qualifications of that leader as it

is an important factor in project performance. As seen from Odusami, Iyagba & Omirin (2003) that there was significant relationship between the project leader's professional qualifications, his leadership style, team composition and overall project performance. See the results below,


*Figure 20: Percentage of leader's professional qualification*

*4.9. Regression Analysis*
Table 4.5 shows the findings that indicate that, cost of equipment and materials, cost of variation orders, cost of rework and escalation of material prices are positively associated with construction cost of the project. This suggest that, predictor variables, cost of equipment and materials, cost of variation orders, cost of rework and escalation of material prices are all statistically significant with performance of construction projects.
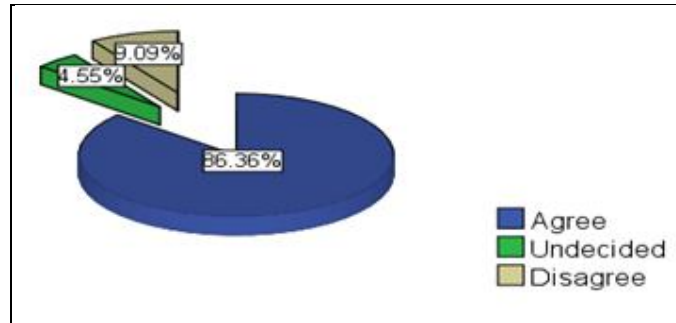
| Independent cost of materials factors | Coefficients | p-value |
|---|---|---|
| Cost of equipment and materials | .296 | .148 |
| Cost of variation orders | .364 | .141 |
| Cost rework | .315 | .201 |
| Escalation of material prices | .236 | .236 |

*Table 5: Showing regression results for construction cost and cost of material factors*

The regression analysis shows that the independent variables are statistically independent and the escalation of material prices the most significant followed up by, cost of equipment and materials, cost of rework and cost of variation orders in that respective order. According to the research finding, escalation of material prices has higher effect on the construction cost followed by cost of equipment and materials, cost of rework and the cost of variation orders is the factor that has least effect on construction cost.
From the findings, it can be explained that every time cost of equipment and materials is increased by 1 unit, construction cost increases by 0.296 when all other variables are held constant. When cost of variation orders is increased by 1 unit, construction cost is increased by 0.364 when all other variables are held costant and when cost of rework is increased by 1 unit, construction cost is increased by 0.315 when other factors are held costant. When escalation of material prices is increased by 1 unit, construction cost increases by 0.236 when other factors are held constant.

4.9.1. Regression result for construction time and time management factors
From the table 6, findings indicate that, there is percentage of orders delivered late, delayed in claim approval and delayed payment from the cliecnttocontractor are positively associated with construction time while estimated time for the project is negatively associated with construction time.

| Time management factors | Coefficients | p-value |
|---|---|---|
| Estimated time for the project | -.249 | .260 |
| Percentage of order delivered late | .500 | .054 |
| Delayed claim approval | .126 | .570 |
| Delayed payment from the client to contractor | .149 | .548 |

*Table 6: Regression result for construction time and time management factors*

The results shows that percentage of orders delivered late has higher effect on construction cost fowolled up by,estimated time for the project, delayed payment from the client to contractor and delayed claim approval. From the findings, every estimated time for the project increase by 1 unit, construction time decrease by 0.249 when other factors are held constant, when percentage of order delivered late increase by 1 unit, construction time increase by 0.500 when other factors are held constant. When delay in claim approval increase by 1 unit, construction cost increase by 0.126 when other factors are held constant and when delayed payment from the client to contractor increase by 1 unit, construction time increase by 0.149 when other factors are held constant.
Regression result for client satisfaction and quality management factors
Table 4.7 shows the findings that indicate that, level of qualification of personnel, quality of materials and equipment, conformance to specification and quality assurance and follow up are positively associated with client satisfaction with the

project. This suggest that, predictor variables, level of qualification of personnel, quality of materials and equipment, conformance to specification and quality assurance and follow up are all statistically significant for performance of construction projects.

| Independent Quality factors | Coefficients | p-value |
|---|---|---|
| Qualification and experience of personnel | .573 | .241 |
| Quality of materials and equipments | .264 | .470 |
| Conformance of specifications | -1.328 | .136 |
| Quality assurance and follow up | .436 | .465 |

*Table 7: Regression result for client satisfaction and quality management factors*

The regression analysis shows that the independent variables are statistically independent and conformance to specifications the most significant followed up by, qualification and experience of personnel, quality assurance and follow up and quality of material and equipments in that respective order. According to the research finding, conformance to specification has higher effect on the client satisfaction followed by qualification and experience of personnel, quality assurance and follow up and quality of material and equipments has least effect on client satisfaction.

From the findings, it can be explained that every time qualification and experience of personnel increase by 1 unit, client satisfaction increase by 0.573 when other factors are held costant. When quality of material and equipments increase by 1 unit, client satisfaction increases by 0.264 when other factors are held costant. When conformance to specification increases by 1 unit, client satisfaction increases by 1.328 when other factors are held costant and when quality assurance and follow up increase by 1 unit, client satisfaction increases by 0.436 when other factors are held constant.

## 5. Summary, Conclusions and Recommendations

### 5.1. Introduction
This chapter presents the summary of research findings, conclusions, recommendations and suggestions for further research.

### 5.2. Summary of the Major Findings

#### 5.2.1. Performance of Construction Project
Most of the respondent executed project of value greater than 20M. There was a mixed reaction on the number on project executed in the last five years as most of the respondent had executed less than 10 projects. Majority of projects executed had a higher percentage of cost overrun, were delayed in time. This results agree with what Nyangilo, (2012) had found out that the performance of the construction in Kenya is poor as time and cost performance of projects are escalated. A majority of respondent indicated that their clients were sometimes satisfied with the project they executed. These are some of project performance indicators as Akintoye and Takim (2002) stated the seven project performance indicators, namely: construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service.

#### 5.2.2. The Cost of Materials
The study found out that majority of respondent purchase construction materials always when they are required, apply current quotation materials and equipment cost record in estimating the construction cost of the project. Higher percentage of the respondent agreed that cost of equipment and materials affect the performance of construction projects, cost of variation orders, cost of rework and  escalation of material prices affect the performance of construction projects. This is an indication that these cost factors affect the performance of construction projects as indicated by Amusan (n.d) who discovered that factors such as contractor's inexperience, inadequate planning, Inflation, incessant variation order, and change in project design were critical to causing cost overrun.

#### 5.2.3. Time Management Practices
It was discovered form the findings that majority of respondents accepted that they participated in pre-planning effort, they used critical path method to present their planning and scheduling of the project, required the subcontractors to submit on a weekly basis inadvnce to adjust their schedule and provided bonus in position as incentive to stimulate construction time.

The respondent response on time factors that affect the performance of construction indicated that time is a factor that must be put into consideration. High percentage of the respondent strongly agreed that estimated time, percentage of order delivered, delay in claim approval and that delayed payment from the owner to the contractor affect the performance. This is also stated by Wiguna and Scott (2005) who showed that the critical risks affecting both project time and cost perceived by the building contractors were similar. They were: high inflation/increased material price, design change by owner, defective design, weather conditions, delayed payments on contracts and defective construction work.

#### 5.2.4. Quality Management Practices
Quality management as a factor that affect the performance of construction project it was found out that most of the contractors took the materials for construction to a central laboratory for testing, conducted a training session on monthly basis, Quality management is a factor that affect the performance of construction since respondents strongly agreed that qualification and

experience of staff, quality of equipment and material used, conformance to specification and that quality assurance and follow up has influence the performance of construction projects.

### 5.2.5. Leadership Style
Most contractors selected leaders based both on experience and level of education. Most of the respondent agreed that actually staff training and leader's professional qualification has influence on performance.

### 5.3. Conclusion
The key factors that affect the performance of construction project are cost of materials, time management, quality management and leadership style. The contractor should see into it that takes into consideration the cost of equipment and materials when planning for the project as failure to which cost of project may escalate. Cost of variation orders increase the cost of project. The contractor should ensure that all variation orders are clearly stated and accounted for by the client. Cost of rework increase the cost of project, while escalations of material price affect the final cost of material if materials are bought at a higher price than the stated.

Time management is an important factor that the contractor should ensure that it is well planned for. Delivering orders late to the site should be avoided. Claim approval determines how fast the project will be executed. When claims are not approved on time, it leads to some activity lagging behind that must be approved. Client should ensure that they pay their contractors on to motivate them to work faster.

The client requires to value the money he has spent in the project, therefore the contractor should ensure that he selects qualified and experienced staffs, use materials and equipment of good quality, ensures that his staffs always conforms to specification and that he conduct quality training and follow up. Training the staffs on new skills is important and the contractor should select leaders based on their qualifications.

### 5.4. Recommendations

### 5.4.1. Recommendations for Practice
Based on the research findings, the following recommendation should be put into practice for a contractor who aims at performing better in construction projects. Contractors should ensure that they take all the necessary precautions so as to avoid construction cost overrun. They should also ensure that time estimated for the project is not superseded and they should make sure that their projects satisfy the client needs.

The contractors should be very keen in bidding for the project so that they quote the exact cost and not low cost to enable they win the bid. When there is variation on the project, the contractor should ensure that the concern part has accounted for it. Contractors should be in control on the work to reduce cases of rework and should buy materials in bulky at the start of the project to avoid effect of escalation of prices.

Before the contractor starts the project, he should ensure that he has estimated the time for the project with very minimal variations as this will help solve the problem of under estimating the project duration. He should agree with the vendors on when to supply the materials to avoid late delivery of materials on site. They should agree with the client that incase of delay due to late approval of claims and late payments from the client, the client should be responsible.  Contractors should use qualified and experienced staffs, use good quality of materials and equipment and ensure that the project conforms to the specification. Leaders and staffs should be trained on new skills to improve on their performance.

### 5.4.2. Areas for Further Study
This study focused on factors affecting performance of construction projects in Kenya. A study should find out between public and private construction projects, which one has got higher performance level. A development of performance measurement framework and modeling system in order to measure performance of construction organizations and projects is also required.

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**Annexure**

   **A.** QUESTIONNAIRE

**Part one: general information:** Please add (/) as appropriate:

1. Name of the company……………………………………………..

2. Job title of the respondent**:**
      ( ) Project Manager/ deputy           ( ) Site Engineer/ office engineer
      ( ) Organization Manager/ deputy     ( ) Others (specify).....

3. Company size: (number of employees):
      Number of employees in your company is ......... employee

4. Years of experience of the respondent:
      Number of experience years of the respondent is ..........Years.

5. Value of executed projects executed in the last five years: (in million dollars)
      ( ) Less than 5 M            ( ) less than 10 M
      ( ) less than 20 M          ( ) More than or equal 20 M

**Factors affecting the performance of construction projects in Kenya.**

1.1 How many construction projects have you executed in the last 5 years?
      ( )  1 to 10           ( ) 11 to 20
      ( ) 21 to 30         ( ) More than 30

1.2 From the above executed construction projects, how many had construction cost overrun?
      ( )  1 to 10           ( ) 11 to 20
      ( ) 21 to 30         ( ) More than 30

1.3 By which percentage did the above construction projects had a cost overrun?
      ( ) About 20%           ( ) 21% to 50%
      ( ) 51% to 100%         ( ) over 100%

2.1 Based on the number of construction project executed in 1.1 above, how many were completed on time?
      ( )  1 to 10           ( ) 11 to 20
      ( ) 21 to 30         ( ) More than 30

2.2 By which percentage was the construction projects executed delayed in time?
      ( ) About 20%          ( ) 21% to 50%
      ( ) 51% to 100%       ( ) over 100%

3.1 Was the client satisfied with the projects you executed?
      ( ) Always        ( ) Sometimes        ( ) Not at all

3.2 Based on the satisfaction of the client above, which category does your answer fall for the option sometimes and not at all?
      ( )  1 to 10           ( ) 11 to 20
      ( ) 21 to 30         ( ) More than 30

**Practices concerning with the Factors Affecting the Performance of Construction Projects in Kenya;**

**1.**   **The cost of materials:** Please add (/) as appropriate:

1.1 How often do you purchase materials for your projects?
      ( ) At the start of the project
      ( ) At mid of the project
      ( ) Always when they are required

1.2  Does the fluctuation of the market price of materials affect the cost of the initial budget for the materials?  (……….)
     Which measures have you taken to prevent that? Highlight some…………………………

1.3  Does material wastage have impact on frequency of material purchase? (…..)
     What have you done to control this? State.
          …………………………………………………………………

1.4 Do you apply the following records to estimate the construction cost for the project? (Can be selected more than one option)
      ( ) Historical cost data        ( ) Current quotation material and equipment cost
Others (.............................)

**1.5 Please express your opinion on the following cost of material factors that affect the performance of construction projects;**

|  | Cost Factors | Agree | undecided | Disagree |
|---|---|---|---|---|
| a. | Cost of equipment and materials |  |  |  |
| b. | Cost of variation orders |  |  |  |
| c. | Cost of rework |  |  |  |
| d. | Escalation of material prices |  |  |  |

**2. Time management practices**

2.1 Does your company formally participate in the pre-project planning effort? (…..)

2.2 Which software do you apply for planning and scheduling the progress of the project?

   ( ) Primavera          ( ) Microsoft project          ( ) Excel sheet          ( ) Others (……...)

2.3 Which kind of method do you use to represent the project planning and scheduling?

   ( ) Bar Chart method      ( ) Critical path method      ( ) S-Curve method    ( ) Others (.........)

2.4 How often your project team does formally meets for discussion of monitoring, updating and controlling the progress?

| ( ) Very frequently | ( )Frequently | ( ) Occasionally | ( ) Rarely | ( ) Never |
|---|---|---|---|---|

2.5 How often do you require the sub-contractors or supplier to submit their detail activities schedule for you in advance to adjust your actual schedule?

   ( ) Daily          ( ) Weekly          ( ) Monthly          ( ) No

2.6 How do you supply the incentive system to stimulate the construction time?

   ( ) Increase salary     ( ) Bonus in position     ( ) Training          ( ) Others (......................)

**2.7 Please express your opinion on the following time management factors that affect the performance of construction projects;**

| Time Factors | Agree strongly | Agree moderately | Agree slightly | Disagree slightly | Disagree strongly |
|---|---|---|---|---|---|
| Estimated time for project construction |  |  |  |  |  |
| Percentage of orders delivered late |  |  |  |  |  |
| Delay in claim approval |  |  |  |  |  |
| Delay in payment from owner to contractor |  |  |  |  |  |

**3. The quality management practice**

3.1 Does your quality controller always take your materials for construction to central laboratory for testing before using them? (…...)

3.2 Which other precautions do you always take on site to ensure good quality of the product?

   …………………………………………………….

   …………………………………………………...

3.3 How often do you conduct a quality training session for your employees?

( ) Weekly                ( ) Monthly                ( ) None

**3.4 Please express your opinion on the following quality management factors that affect the performance of construction projects;**

| Quality Factors | Agree strongly | Agree moderately | Agree slightly | Disagree slightly | Disagree strongly |
|---|---|---|---|---|---|
| Qualified and experienced personnel |  |  |  |  |  |
| Quality of materials and equipment used in the project construction |  |  |  |  |  |
| Conformance to specifications |  |  |  |  |  |
| Quality assurance training and follow up |  |  |  |  |  |

**4. Leadership style practices**

4.1 How do you select leaders to execute the construction projects?

( ) Based on experience                ( ) Based on level of education

   ( ) Both                            ( ) None

4.2 Which leadership style do you recommend to be adopted on site? Highlight.

……………………..

4.3 How does management relate to its subordinates?

( ) Commanding                ( ) socially                ( ) Authoritative

4.4 How efficient does the workers perform their obligations?

( ) Faster                ( ) Sluggish                ( ) Moderately

**4.5 Please express your opinion on the following leadership factors that affect the performance of construction projects;**

| Leadership style factors | Agree | undecided | Disagree |
|---|---|---|---|
| Training | | | |
| Leader's professional qualification | | | |

**B. TABLES**

**1.1 Tables on the influence of construction cost on the performance of construction projects**

| | Time of purchase | Frequency | Percent |
|---|---|---|---|
| | At the start | 5 | 22.7 |
| | At the mid | 15 | 68.2 |
| | Always | 1 | 4.5 |
| | Total | 21 | 95.5 |
| | Missing | 1 | 4.5 |
| Total | | 22 | 100.0 |

*Table 1: shows how often the contractors purchase materials*

| Opinion | | Frequency | Percent |
|---|---|---|---|
| | Yes | 19 | 86.4 |
| | Missing | 3 | 13.6 |
| Total | | 22 | 100.0 |

*Table 2: shows how increase in material price affect the initial budget*

| Opinion | Frequency | Percent |
|---|---|---|
| Yes | 18 | 81.8 |
| No | 4 | 18.2 |
| Total | 22 | 100.0 |

*Table 3: Shows how material wastage have impact on frequency of purchase of materials*

| Records | Frequency | Percent |
|---|---|---|
| Historical | 4 | 18.2 |
| Quotation | 18 | 81.8 |
| Total | 22 | 100.0 |

*Table 4: shows the records applied in estimating the construction cost*

**2. Tables on the influence of time management on the performance of construction projects**

| Opinion | Frequency | Percent |
|---|---|---|
| 1 | 21 | 95.5 |
| 2 | 1 | 4.5 |
| Total | 22 | 100.0 |

*Table 5: on whether the firm participates in pre-project planning*

| Software | Frequency | Percent |
|---|---|---|
| Excel | 11 | 50.0 |
| Microsoft | 11 | 50.0 |
| Total | 22 | 100.0 |

*Table 6: shows the software that the firms use in planning and scheduling*

| | Method | Frequency | Percent |
|---|---|---|---|
| | Bar chart | 10 | 45.5 |
| | Critical path | 5 | 22.7 |
| | S-Curve | 4 | 18.2 |
| | Others | 2 | 9.1 |
| | Total | 21 | 95.5 |
| | Missing | 1 | 4.5 |
| Total | | 22 | 100.0 |

*Table 7: shows how firms presented planning and scheduling for the projects*

| Frequency of discussion | Frequency | Percent |
|---|---|---|
| Weekly | 3 | 13.6 |
| Monthly | 16 | 72.7 |
| None | 2 | 9.1 |
| Total | 21 | 95.5 |
| Missing | 1 | 4.5 |
| | 22 | 100.0 |

*Table 8: shows how often the firms discussed project monitoring and update*

| Often | Frequency | Percent |
|---|---|---|
| Daily | 1 | 4.5 |
| Weekly | 15 | 68.2 |
| Monthly | 5 | 22.7 |
| No | 1 | 4.5 |
| Total | 22 | 100.0 |

*Table 9: shows how often the sub-contractors were required to submit schedules to the main contractor for adjustment to the main schedule*

| Method | Frequency | Percent |
|---|---|---|
| Bonus in position | 15 | 68.2 |
| Training | 7 | 31.8 |
| Total | 22 | 100.0 |

*Table 10: showing how firms provided for incentives for their staffs*

**3. Tables on the influence of quality management on the performance of construction projects**

| Opinion | Frequency | Percent |
|---|---|---|
| Yes | 21 | 95.5 |
| No | 1 | 4.5 |
| Total | 22 | 100.0 |

*Table 11: shows whether the firms took the materials for testing*

| Often | | Frequency | Percent |
|---|---|---|---|
| | Weekly | 2 | 9.1 |
| | Monthly | 18 | 81.8 |
| | None | 2 | 9.1 |
| | Total | 22 | 100.0 |

*Table 12: shows how often the firms conducted staff training*

**4. Tables on the influence of leadership style on the performance of construction projects**

| Mode of selection | Frequency | Percent |
|---|---|---|
| Experience | 9 | 40.9 |
| Qualification | 3 | 13.6 |
| Both | 10 | 45.5 |
| Total | 22 | 100.0 |

*Table 13: shows how leaders were selected for the projects*

| Opinion | Frequency | Percent |
|---------|-----------|---------|
| Yes | 21 | 95.5 |
| No | 1 | 4.5 |
| Total | 22 | 100.0 |

*Table 14: show whether the type of personality influenced the type of leadership style adopted*

| Relation | Frequency | Percent |
|----------|-----------|---------|
| Commanding | 1 | 4.5 |
| Socially | 16 | 72.7 |
| Authoritative | 4 | 18.2 |
| Missing | 1 | 4.5 |
| Total | 22 | 100.0 |

*Table 15: shows how management relates with the staffs*

| Efficiency | Frequency | Percent |
|------------|-----------|---------|
| Faster | 6 | 27.3 |
| Moderately | 16 | 72.7 |
| Total | 22 | 100.0 |

*Table 16: shows how efficiently staffs performed their cores*