FACTORS INFLUENCING EFFECTIVE AND EFFICIENT DELIVERY OF ROAD CONSTRUCTION PROJECTS IN KENYA: A CASE OF NAIROBI COUNTY

BY

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DECLARATION

This research project is my original work and has not been presented for any award in any other university.

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DEDICATION

This research project is dedicated to all my family members, especially my wife, Ann Wanjiku Kahura, for the moral support and understanding and all my friends for their inspiration, support and encouragement throughout the research period.

God bless you all.

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LIST OF ABBREVIATIONS AND ACRONYMS

B.O.Q	Bills of Quantity
BPM	Building Project Management
CTP	Construction Time Performance
ECI	Early Contractor Involvement
ESI	Early Supplier Involvement
GNP	Gross National Product
ISO	International Organization for Standardization
IT	Information Technology
KPIs	Key Performance Indicators
KRB	Kenya Roads Board
KURA	Kenya Urban Roads Authority
NCA	National Construction Authority
PAR	Performance Appraisal and Reporting
PM	Project Management
PPI-	Project Performance Indicators
PPMS	Project Performance Monitoring System
SPSS	Statistical Package for Social Science
TQC-	Total Quality Control
TQM	Total Quality Management

ABSTRACT

Globally many road contractors have failed in performance. In addition, performance measurement systems are not effective or efficient to overcome this problem. Road contractor's performance problem appears in many aspects in developing countries. Many road projects fail in time performance, others fail in cost performance and others fail in other performance indicators. In Kenya, there are many road contractors who have failed in performance. In the past, many road projects were finished with poor performance because of many contractors' reasons such as: benchmarking, management, application of information technology, IT and time schedule. It's against this realization that the current study aims to explore factors influencing performance of road in Kenya contractor with focus in Nairobi County. The study will focus on how benchmarking, project management, IT and time schedule influence road contractors performance. The study will employ descriptive research design while target population will be road contractors in Nairobi County. The study will employ stratified sampling technique in coming up with a sample size of 42 from a total population of 106 respondents. The study relied mostly on primary data sources where self-administered questionnaire was utilized as source of data. Data was collected purely quantitative. Quantitative data was coded and entered into Statistical Packages for Social Scientists (SPSS Version 21.0) and analyzed using descriptive statistics. The finding was presented inform of frequency tables while explanation was presented in prose. The study concluded thatmost of the organizations employ benchmarking as a tool for achieving partnering excellence in construction projects and that benchmarking approach is used in our organization in order to determine the organizational strong and weak points. Likewise the survey concluded that project management influence road contractor's performance and that there exist relationship between the two. Inclusively, the study concluded that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system and that effective communication. Also the study concluded that most of the organization applies IT in their operation as a mean of improving their performances while it also eases the process and procedure of operation. Finally, the study concluded that time affects effective and efficient delivery of road construction projects while availability of resources as planned through project duration average delay in payment from owner to contractor

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Globally many road contractors have failed in performance. In addition, performance measurement systems are not effective or efficient to overcome this problem. Road contractor's performance problem appears in many aspects in developing countries. Many road projects fail in time performance, others fail in cost performance and others fail in other performance indicators. In the past there were many road projects which finished with poor performance because of many evidential reasons such as: obstacles by client, non-availability of materials, road closure, amendment of the design and drawing, additional works, waiting the decision, handing over, variation order, amendments in Bill of Quantity (B.O.Q) and delay of receiving drawings (UNRWA, 2006). There are other indicators for problems of road contractor's performance in developing countriessuch as project management, coordination between participants, monitoring, and feedback and leadership skills. In addition, political, economic and cultural issues are three important indicators related to failures of road projects' performance in the Country (UNRWA, 2006).

The importance of identifying an organization's performance is evident throughout the world-wide markets, the results of which are to attract future investment, increase share value and attract high calibre employees. Therefore, it is important to consider how an organization's performance is measured and how it can be communicated to the wider market i.e. how can it be understood and interpreted by the potential investors, employees and customers. The basis of formulating performance indicators that achieve the latter have been in operation as early as the beginning of our century (DETR, 2006). Those performance indicators have traditionally concentrated on finances e.g. return on investment, sales per employee, and profit per unit production, which as Fox *et al* (2008) suggests "financial measures are useful - but they tend to measure the past - and they tend to measure the easily-measurable." The apparent inadequacy of financial measures for contemporary businesses has been identified by a number of authors (Arditi & Mochtar, 2006).

Road construction industry plays a major role in development and achievement the goals of society. Construction is one of the largest industries and contributes to about 10% of the gross national product (GNP) in industrialized countries (Navon, 2005). Construction industry has

complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders and regulators. The performance of the construction industry is affected by national economies (Navon, 2005).

While individual organizations have been measuring their performance for many years, there has been little consistency in the data, and the way it has been published. The performance can be measured by key indicators for evaluation. The purpose of Key performance indicators (KPIs) is that clients want their projects delivered on time, within budget, as per the specifications, efficiently, right first time, safely, by profitable companies. So, Regular clients expect continuous improvement from their construction team to achieve year-on-year reductions in project costs and time and achieve quality product. In addition, the Key Performance Indicators (KPIs) can be used for benchmarking purposes, and will be a key component of any organization move towards achieving best practice. Clients, for instance, assess the suitability of potential suppliers or contractors for a project, by asking them to provide information about how they response to a range of indicators. Some information will also be available through the industry's benchmarking initiatives, so clients observe how potential suppliers compare with the rest of industry in a number of different areas. Construction supply chain companies will be able to benchmark their performance to enable them to identify strengths and weaknesses, and assess their ability to improve over time. The KPIs framework consists of seven main groups: time, cost, quality, client satisfaction, client changes, business Performance, health and safety (DETR, 2006).

The construction industry is very important in the economic development of any nation especially in developing countries such as in expanding economy like in Sub Saharan countries (Ibironke, 2008). An efficient construction sector is a pre- requisite to effective national development since building civil and industrial engineering works are usually a major contributor to Gross Fixed Capital Formation, Gross Domestic Product and National Employment (Oyewobi & Ogunsemi, 2010). The growth of construction industry in Nigeria in the past two decades indicates its success in greatly contributing to the country's Gross National Product, which was 1.72 in year 2007 (Federal Bureau of Statistics). Aminudin (2006) stated that up to 30% of construction is rework, labour is used at only 40% to 60% of potential efficiency and at least 10% of materials are wasted. It was posited that rework costs could be significantly higher than figures reported in the previous literature (Love & Smith, 2006). Measuring

performance for construction industry is a complex issue. Every contractor is unique in terms of location, design specifications, delivery methods, administration, and participants (Alwi et al 2008). If the most important influencing factors in any contracting organization are identified, measures can then be taken to apply them in order to upgrade the contractor's performance.

In many ways, the pace of the economic growth of any nation can be measured by the development of physical infrastructures, such as buildings, roads and bridges. The failure of any construction project is mainly related to the problems and failure in performance. Moreover, there are many reasons and factors which attribute to such problem. The construction industry performance problems in developing economies can be classified in three layers: problems of shortages or inadequacies in industry infrastructure (mainly supply of resources), problems caused by clients and consultants and problems caused by contractor incompetence/inadequacies. Okuwoga (2008) identified that the performance problem is related to poor budgetary and time control. Long et al (2004) remarked that performance problems arise in large construction projects due to many reasons such as: incompetent designers/contractors, poor estimation and change management, social and technological issues, site related issues and improper techniques and tools. Navon (2005) stated that the main performance problem can be divided into two groups: (a) unrealistic target setting (planning) or causes originating from the actual construction (in many cases the causes for deviation originate from both sources).

Oyewobi and Ogunsemi (2010) equally described the main categories of waste during construction process as reworks/repairs, defects, material allocation, unnecessary material handling and material waste. Rework in construction projects is referred to as the unnecessary effort of redoing a process or activity that was incorrectly implemented in the first instance. Rework can result from an array of factors such as errors, omissions, failure, changes, poor communication and poor coordination and ultimately the profit margins as well. Reworks equally contribute to time and cost overruns in projects (Oyewobi et al, 2011).

Performance indicators are used to measure performance in road construction projects. These indicators can then be used for benchmarking purposes, and will be a key component of any organization's move towards achieving best practice in order to overcome performance problem. However, this study aims at identify the factors and attributes affecting the effective and efficient delivery of road construction projectsin Kenya and to obtain main criteria and

indicators to measure performance. The Performance of Road Construction Firms literature is replete with voluminous literature on the factors influencing performance of road contractor. However, extant review of the literature reveals that, many of these studies have often focused on the relatively large companies who often undertake the very large projects in the major cities of the economy (Ahadzie, 2011; Fugar and Agyarkwa-Baah, 2010). Small-Scale Building Contractors (SSBCs), who constitute over 90% of the job market, have often been left out of the sampling frame. Yet, although these firms are classified as small, in financial terms, they collectively contribute substantially to overall construction GDP, especially in the development of decentralized and local government areas.

Indeed, these small firms could also be accounting for over 50% (cost-wise) of all building materials production and nearly 80% of all short-term employment (including casual labour), especially for unskilled workers in many deprived communities in developing countries (Ganessan, 2003). It is contended that, given that these "so-called" small firms provide a structural base to the economy and also determine the productivity of investment and, accordingly, the rate of development in decentralized and rural areas of the economy, their evaluation of the factors influencing effective and efficient delivery of road construction projectswould go a long way in helping to develop a useful framework for improving construction performance in the sector. This empirical examination is a contribution towards achieving that.

A feature of road Construction Firms in the developing countries is that, they are often believed to be one-man enterprises, having low financial and capital base and also lacking the requisite managerial skills to adequately face up to the numerous and difficult challenges they constantly have to encounter in a typical developing economy such as Kenya's (Ahadzie, 2007). Notwithstanding the difficulties however, these small firms tend to have a very wide geographical dispersion championing local government development in the many rural and remotest parts of the country. Official statistics indicates that, indeed, these so-called small firms represent over 95% of contractors operating in the economy. In this respect, their activities are useful in stimulating growth in many rural and deprived communities where the government is rigorously championing local development.

Within the foregoing context, it is also to be noted that, the dominant role of small firms by classification in the Kenyan construction sector is not by accident (Wells, 2007). Typically, construction is essentially a large industry of small firms in all construction economies (Wells, 2007). Among others, this dominance of small-scale contractors is dictated by particular characteristics of the industry, such as the wide dispersion of the demand, flexibility in the scale of production, lack of standardization of materials, the effect of climatic controls on the use of materials, some of which can be very bulky; the low capital requirement for entry, especially for craft-based jobs (Wells, 2007).

In Kenya, over the years the manufacturing industry has achieved great improvement in productivity, while the construction industry productivity has remained stagnant (Lee et al 2006). The core of the new production philosophy is in the observation that there are two aspects in all production systems, and are conversions and flows. Conversions were identified as value–adding activities whereas flows were identified as non-value adding activities (Alwi et al, 2007). A value adding activity is one that converts materials towards that which is required by the customer. A non-value adding activity is one that takes time, resources or space but does not add value to the final output. In most cases a non-value adding activity is known as waste. Koskela (2006) argues that if the project participants ignored the flow aspects, it will results in significant amount of wastes, non-value adding activities and loss of value in the construction industry.

In Nairobi County, most contractors, particularly road contractors have shown lot of interest in the sector. However, most of these firms have been performing minimally. Small-Scale Building Contractors (SSBCs), who constitute over 90% of the job market in construction sector, have often been left out of the sampling frame. Yet, although these firms are classified as small, in financial terms, they collectively contribute substantially to overall construction GDP, especially in the development of decentralized and local government areas. Indeed, these small firms could also be accounting for over 50% (cost-wise) of all building materials production and nearly 80% of all short-term employment (casual labour) especially for unskilled workers in many deprived communities in Kenya (Ministry of Planning, 2010).

From the records available with the City Engineer's department, Nairobi County, the total road network is 2,968km out of which 1,331.1km have been paved with bituminous surface, 504.1km are of gravel standards and 1,133.6km have earth surface. The responsibility of

maintaining this road is vested with the Kenya Urban Roads Authority, KURA, who get the funding from the Kenya Roads Board, KRB. However, KURA delegates maintenance of the roads by engaging road contractors. There are 34 fully registered road contractors under the National Contraction Authority (NCA) (Ministry Road and Public Works, 2013). The Road Contractors are registered and categorised according to their experience, capability both in technical and financial.

The governments on the other hand strive to allocate enough funds to ensure the road are maintained and improved. The estimated projected collections of the Road Maintenance Levy Fund (RMLF) during the Financial Year FY 2012/2013 are Ksh. 24,000,000,000(twenty four billion shillings). Similarly, the estimated collections of the Transit Tolls (TT) during that same Financial Year are Ksh. 400,000,000 (four hundred million shillings). These two primary sources of funds, contribute more than 99% of the funds deposited into the KRBF. Additionally, about Ksh. 90,000,000 (ninety million shillings) was received from agricultural cess. This brings the total KRBF to Kshs24,490,000,000(twenty four billion, four hundred and ninety million).

Despite immense allocation of the fund by the government in all its financial budget, the sector face a challenge with poor management of funds and poor delivery of services to the road user being mostly cited as the major drawback in the performance of the road sector. However, it's encouraging to note that the Government has continued to strengthen both the economic and political reforms with introduction of Performance Contracts which aim at improving delivery of services to the public. The enactment of the Kenya Roads Act 2007 and operationalization of the three road implementing authorities (Kenya National Highways Authority, Kenya Rural Roads Authority and Kenya Urban Roads Authority) for the roads sub-sector also streamlines implementation within the sub sector. The authorities are fully operational and implementing road works programmes. Despite the effort by the government through the ministry of road and the effort no Kenya National Highways Authority, Kenya Rural Roads Authority and Kenya Urban Roads Authority no study has been done on the factors influencing effective and efficient delivery of road construction projects in Kenya.

1.2 Statement of the Problem

Many road contractors have failed or perform minimal in their performance, particularly in maintenance of road. The criticism against their performance has attracted the government

attention forcing it to come up with performance contract and even settling the authority to oversee the contractors' performance. However, according to government of Kenya (2012) the poor performance of the road contracts is due to poor management of funds and poor delivery of services to the road user. In addition, performance measurement systems are not effective or efficient to overcome this problem. Road contractor's performance problem appears in many aspects, ranging from fail in time performance, cost performance and others fail in other performance indicators. Ugwa and Haupt (2007) opined that the failure of any road contractor is mainly related to the problems associated with resource management and even political interferences'. Moreover, there are many reasons and factors which attribute to such this problem.

In Kenya, there are many road contractors who have failed in performance. In the past, many road projects were finished with poor performance because of many contractors' reasons such as: obstacles by client, non-availability of materials, roads closure, amendment of the design and drawing, additional works, waiting the decision, handing over, variation order, amendments in Bill of Quantity and delay of receiving drawings (UNRWA, 2006). For example, project of rehabilitation of Waiyaki highway finished with problems in both of time and cost performance (UNRWA, 2007). In addition there are other indicators of performance such as project managers, coordination between participants, monitoring, and feedback and leadership skills. However, there are three important issues related to failures and problems of performance in Kenya which are political, economic and cultural issues.

Local studies done includes, Musa (2012) did a study on effects of total quality management on performance of Companies in Kenya a case study of Interbuild Company Limited. He found that human resource management and resource management affects performance of the building company to a great extent. Bundi (2011) did a survey on challenges in the management of procurement services within Kenya Rural Roads Authority. She found that political interferences and inadequate allocations of funds hinder completion of KRRA activities even though the authority fully implements procurement policies. Nyamwaro (2011) did a study on analysis of challenges facing project implementation a case study of Ministry of Roads Projects. The study deduced that poor communication and lack of awareness on POA which is also used in the implementation of the Ministry's Projects were the main challenges facing project implementation. Despite immense study focusing on ministry of road and its associates,

no study has focus on the Effective and Efficient Delivery of Road Construction Projects. Thus, this study aimed to bridge this knowledgeable gap by evaluating factors influencing effective and efficient delivery of road construction projects in Kenya with focus to Nairobi County.

1.3 Objectives of the Study

The study was guided by the following objectives:

i. To establish the influence of benchmarking on effective and efficient delivery of road construction projects in Kenya.
ii. To determine the influence of project management on effective and efficient delivery of road construction projects in Kenya.
iii. To examine the influence of Information technology on effective and efficient delivery of road construction projects in Kenya.
iv. To assess the influence of time of project completion on effective and efficient delivery of road construction projects in Kenya.

1.4 Purpose of the Study

The purpose of this study was to explore factors influencing effective and efficient delivery of road construction projects in Kenya with focus Nairobi County.

1.5 Research Questions

i. To what extent does benchmarking influence the effective and efficient delivery of road construction projects in Kenya?
ii. To what extent does project management influence the effective and efficient delivery of road construction projects in Kenya?
iii. To what extent does information technology influence the effective and efficient delivery of road construction projects in Kenya?
iv. To what extent does time of project completion influence the effective and efficient delivery of road construction projects in Kenya?

1.6 Significance of the Study

The finding of the study is hoped to be of great importance to the government as it may apply the finding of the study to ensure construction companies such as Small-Scale Building Contractors (SSBCs) play their key role more particularly in economic growth and job creation.

Further, the finding of this study may benefit the government through ensuring policies put in place to govern construction sectors and that are favorable to their growth and that their performance will play a key role in national building toward achieving millennium goal such as vision 2030.

The findings of this study may also benefit the road contractors in Kenya. By using analyzed results, contractors in small firms will clearly understand the causes of declining performance of the sector and be conversant with the best solutions in regards to performance in their pursuit for increased their return and sustainability.

The study findings are expected to be of great importance to various researchers involved in policy making. The report of this study will be easily acquired in the library and it may equip the learners with more knowledge and relevant information on factors influencing effective and efficient delivery of road construction projectsin Kenya. The study may also make a myriad contribution to the literature on factors influencing effective and efficient delivery of road construction projectsin Kenya which will be part of articles that may be helpful to researchers who want to further on their study.

1.7 Basic Assumption of the study

The researcher assumed that the respondents would be honest, cooperative, factual (objectivity) and trustworthy in their response to the research instruments and would be available to respond to the research instruments in time. It is also the assumption of the researcher that the authorities in the firms would grant the required permission to collect data from employees. The study further made the assumptions that there would be no serious changes in the composition of the target population that would affect the effectiveness of the study sample.

1.8 Limitation of the study

The researcher encountered various limitations that hindered access to information that the study sought. The main limitation of study was its inability to include more construction firm around the Country. This was a study focusing on road contractors within Nairobi. The study should have covered road contractor across country so as to provide a more broad based analysis. The researcher countered this problem by carrying a study across the road contractors in Nairobi which is the hub of Construction Company and served as a representative.

Some of the respondents targeted were reluctant in giving information fearing that the information sought would be used to intimidate them or print a negative image about them or the firm. The researcher handled the problem by carrying an introduction letter from the University and assured them that the information they gave would be treated confidentially and it would be used purely for academic purposes.

1.9 Delimitation of the Study

The survey covered factors influencing effective and efficient delivery of road construction projects in Kenya. The study will interview government representatives from the ministry of road and public works, contractor (supervisors in the projects), consultant (technical consultant by contractors), and engineers from Nairobi County and technical auditors participating in road contractors projects in Nairobi County. Questionnaire will be used as the main data instrument source where it will be distributed to the sampled respondents. The data for analysis will be collected to the population of 50 staffs working in the road contractors firms in Nairobi County.

1.10 Definition of Significant Terms Used in the Study

Benchmarking A standard against which the performance of a security, mutual fund or investment manager can be measured

Contractor is an independent entity that agrees to furnish certain number or quantity of goods, material, equipment, personnel, and/or services that meet or exceed stated requirements or specifications, at a mutually agreed upon price and within a specified timeframe to another independent entity called contracted, principal, or project owner.

Information technology is a term that encompasses all forms of technology used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived)

Effective and efficient delivery of road construction projects in contract refers to the fulfillment of an obligation, in a manner that releases the performer from all liabilities under the contract.

Project management is the discipline of planning, organizing, motivating, and controlling resources to achieve specific goals.

Road a long, narrow stretch with a smoothed or paved surface, made for traveling by motor vehicle, carriage, etc., between two or more points; street or highway.

Time the measured or measurable period during which an action, process, or condition exists or continues

1.11 Organization of the Study

The research is organized in three chapters. Chapter one introduces the research and presents the statement of problem, objectives, and research questions. The chapter also shows the significance, limitations and delimitations of the study. Chapter two encompasses the literature review on the various aspects concerning performance of road contractor, benchmarking and performance of road constructor, project management and performance of road constructor, information technology and performance of road constructor, time and performance of road constructor. Chapter three focused on the research design, study population, sample and sampling procedure, data collection and data collection procedures, validity and reliability of research instruments and data analysis techniques. Chapter four discusses the data analysis techniques, the findings of the study and presentation of the same findings. Chapter five introduces the conclusion, discussions of the study, recommendations of the study and finally suggestions for further reading.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This section highlights some of the key concepts used in the research and pinpoints some theoretical contributions from the literature. A literature review helps in the development of understanding of the previous research that has been done relating to the objectives, aims and helps in the refinement of the ideas to which the research will be built.

2.2 Effective and Efficient Delivery of Road Construction Projects

Construction industry plays a major role in development and achievement the goals of society. Construction is one of the largest industries and contributes to about 10% of the gross national product (GNP) in industrialized countries (Navon, 2005). Construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders and regulators. The performance of the construction industry is affected by national economies (Navon, 2005). Performance of construction industry is related to many topics and factors such as time, cost, quality, client satisfaction; productivity and safety. However, most construction project suffers from delay, for example construction industry in the Gaza Strip suffers from many problems and complex issues in performance. For example, construction of 14 dwelling units at Rafah Area suffered from poor performance because of delay for about 110 days. There are many realistic reasons such as closures, amendment of drawings and amendment of the design. In addition, there are other different reasons affecting construction projects performance in the Gaza strip such as poor management and leadership; inappropriate participants; poor relations and coordination; absence of motivation, control, monitor or decision making systems; inadequate infrastructure, political problems; cultural problems and economic conditions (UNRWA, 2000).

In Indonesia, productivity of the construction industry is not only influenced by labour, but also by other factors such as equipment, materials, construction methods, and site management (Arditi & Mochtar, 2006). Some concepts such as Total Quality Management (TQM) and Total Quality Control (TQC) have been implemented to achieve better productivity. Since the publication of the ISO 9000 series of standards in 1987 by the International Organization for Standardization (ISO) 9000, quality management has received attention around the world on an unprecedented scale. Initially, the adoption of ISO 9000 in the construction

industry in Indonesia was slower than in manufacturing, and even now many small and medium size organizations have voiced their concerns over the difficulty and cost of introducing an ISO quality system. Thus, the construction industry preferred to adopt their own in-house quality systems to increase productivity.

Unproductive time is one of the most prevalent waste that occurs in the Indonesian construction industry (Kaming *et al*., 2009). The study proved that on average, craftsmen lose time because of internal delays, extra breaks, waiting and relaxation, lack of skill and supervision delay. Overall, they lose a total of 18% of working time per week due to one production problem or another. Similar studies conducted in the United States are consistent with the results. The average of non-productive work is only estimated to be 36% (Oglesby *etal*., 2009) or to be 31.9% (Levy, 2007). Further, Kaming *et al*. (2009) also stated that the main craftsmen's productivity problems in Indonesia were identified as lack of material and followed by rework, absenteeism, interference, lack of tools and equipment break downs. The causes of the material unavailability problems were on-site transportation, inadequate material storage, excessive paper-work requests and inadequate planning. The main causes of rework were found as design changes and poor instruction.

Case studies conducted by Koskela (2000) showed that there was a relationship between reduction of productivity and the incidence of waste in construction. Poor quality was identified by Koskela (2000) as one of the major factors causing low productivity. Some researchers experienced the high amount of poor quality in construction. Cnudde (2001) argued that the cost of poor quality (non-conformance), as measured on-site has turned out to be 10-20% of the total project cost. In an American study of several industrial projects, deviation costs averaged 12.4% of the total installed project cost (Burati *et al*., 2006). The causes of these quality problems are attributed to design, 78%, and to construction at 17%. A study in Indonesian construction industry (Alwi, 2005) found that poor quality of labour skills contributed 3.2% of the total project costs.

In his study, Abu (2007), found that most construction companies in Malaysia started as small, local market companies during the 2002 to 2008 period of construction boom. They expanded at different rates and levels of success and growth. About a quarter failed to progress beyond the local level, and one-third made the local-regional-national transition in 3 to 5 years.

In recent years, with the completion of 'mega-projects' and subsequent economic prudence, local projects were insufficient to sustain the 70,000 odd contractors. Thus, many of the lower ranking contractors have left the industry (CIDB, 2008).

The reviews of the construction industries of the developed and newly industrializing countries have aimed at a radical restructuring of all aspects of the industries. The initiative in Singapore is a good example of such efforts. The Construction 21 exercise in Singapore was launched in a bid to improve the productivity of the industry by reinventing its processes, procedures and practices. The vision of Construction 21 is "To Be a World Class Builder". It set concrete targets for the industry; and recommended initiatives to meet the targets.

Ling et al (2007) remarked that architectural, engineering and construction (AEC) firms may face difficulties managing construction projects performance in China because they are unfamiliar with this new operating environment. Kim et al (2008)stated that international construction projects performance is affected by more complex and dynamic factors than domestic projects; frequently being exposed to serious external uncertainties such as political, economical, social, and cultural risks, as well as internal risks from within the project.

Studies show that the construction industries of developing countries, particularly in Africa, face many problems. For instance, Ghana is well known for slow growth of construction industry. There are three main reasons for these problems. First, the economic weaknesses which these countries face mean that there are inadequate resources to devote to efforts to improve the industry. Moreover, the industry fails to receive the stimuli by way of job opportunities; and the market forces which support innovation are not present. Second, many of the governments of these countries do not recognize the importance and needs of the construction industry, and hence do not formulate and implement programmes for upgrading the industries. Finally, the inherent underdevelopment of the construction industries in these countries means that they are unable to deal with their weaknesses, to make a strong case for help, or to contribute to the efforts which the government makes to develop the industries.

Owing to the problems, the performance of the construction industries on projects in developing countries, including Ghana, is poor in most respects including cost, quality and productivity. On most construction projects undertaken in the developing countries, the results

fall short of the targets set by the participants themselves in terms of budgets (cost), schedules (time) and specifications (quality). The constructed items in these countries are also unsatisfactory in terms of their maintainability and durability. As constructed items involve huge investments and are expected to last for several years, this has significant economic and social consequences. Moreover, the performance of the construction industries in these developing countries compares unfavorably when viewed against those of their counterparts in industrialized nations.

In the last nine years, Kenya has stepped up investment in infrastructure. This is in clear recognition that no economy has ever taken off with a tattered infrastructure. Undoubtedly, this has cost the Kenya government millions and tremendously contributed to the ballooning of the national debt to about Sh1.5 trillion. Most of the so-called cowboy contractors have been kicked out of the business either through lack of political connections, natural attrition or through the dominance of Chinese contractors who come with financial backing from their government. As a result, the standards and speed of construction have improved considerably and the country is enjoying better standards of road construction.

Although at times this arises out of poor costing or cost overshoots, often they can be attributed to incompetence of the construction firms. Not surprisingly, the shoddy construction most often than not occurs in road projects where reputable donors have no oversight. Most people might focus on potholes, but clearly the danger goes beyond that and into public safety. This is the area indeed the new guidelines to be drawn up with the help from Jica must focus on. The stipulation that contractors are held accountable for between five and 10 years will help weed out the sub-standard firms either through vetting or forcing them under financially after they fail to perform to acceptable standards. They must be made to feel the pain of squandering public resources and locking out honest people from contracts. And Kenyans must be allowed to enjoy the fruits of their hard labour.

Construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders, regulators and others. Road contractors in Kenya suffer from many problems and complex issues in performance because of many reasons and factors. It is contended that, given that these “so-called” small firms provide a structural base to the economy and also determine the productivity of investment

and accordingly, the rate of development in decentralized and rural areas of the economy, their evaluation of the factors affecting construction performance would go a long way in helping to develop a useful framework for improving construction performance in the sector.

2.3 Benchmarking and Effective and Efficient Delivery of Road Construction Projects

Benchmarking basically aims at comparing the performance of firms which are related to each other in respect of their capability and output. It provides a framework to check, how a particular construction company compares with the rest of the industry. Firms are required to undertake such exercise periodically which enables them to recognize their strength and weaknesses, in comparison with the industry. Benchmarking aims to identify industry leaders who demonstrate superior performance by using best construction practices. Other firms can adjust their policies, practices, deployment of machineries and equipment etc. to improve their own performance broadly on the lines of leading firms. Even the leading firms/construction industry can evaluate their own performance and set high benchmark for them. Thus, by continually acquiring and applying new knowledge, success of both highway construction firms and highway sector as an industry, will ensure long term benefits which are somewhat eluding us at present. Today, there is no recording/dissemination of parameters of relatively successful firms which could be followed by other firms. There is thus, a need to develop models for benchmarking the performance of Highway Construction in our country.

Tolosi (2000) defined benchmarking as a process which continuously measures the products, services and operational practices of a given organization to compare the organization's performance and operational practices with a selected sample group. In addition to create a basis for comparison, benchmarking is a good development tool because it enforces a self-critical approach, indicating the points of operation the company must improve. Li et al (2006) stated that cooperative benchmarking should be used as a tool for achieving partnering excellence in construction projects. Benchmarking involves a comparative analysis between at least two parties in order to compare the current performance gap.

Tolosi (2000) stated that benchmarking is coming into increasing use in telecoms by management, regulators and offers potential for many useful applications. However, benchmarking must be used with caution, and its design as a tool of analysis must be thoughtfully considered in order to achieve accurate and meaningful indicators. The specific

aspects of production and the companies to be used for benchmarking comparison must be carefully selected. Tolosi (2000) remarked that the term benchmarking is originated from the machine construction industry and refers to grouping technical and financial indicators for comparison amongst companies or across operating units within a company. The output is produced through comparing the key performance indicators of companies operating in comparable environments. Benchmarking helps companies to define the best possible indicators for comparison and to obtain a picture of the company's entire operation. Therefore, benchmarking is a useful tool for evaluating a company.

Li et al (2006) presented an eight-stage process of a cooperative benchmarking approach which can be used to improve the performance of parties entering into partnering agreements. Chan and Chan (2004) obtained that the accurate construction planning is a key determinant in ensuring the delivery of a project on schedule and within budget. It is remarked that there is an increasing global concern about benchmarking best practice measures of construction time performance (CTP) for use by clients, consultants and contractors in the construction industry. Gunduz et al (2005) sought to analyze and reduce productivity losses due to change orders by benchmarking change order impacts on productivity for electrical and mechanical projects. Gunduz et al (2005) mentioned that benchmarking approach can be used in order to determine the organizational strong and weak points, to evaluate its performance, to identification the competitive advantages and disadvantages and to know the improvement priorities for each performance indicator.

Augusto et al (2006) stated that the effective performance cannot be achieved without challenges and obstacles. To meet these challenges and overcome these obstacles, an organization must have a clear understanding of its performance in relation to its competitors. To accomplish this task, an organization must have an organizational benchmarking system which is occupied with analytical models designed to measure multifaceted performance characteristics and parameters. Grigoroudis et al (2006) studied the assessment of user-perceived web quality and used application of a satisfaction benchmarking approach. The benchmarking analysis consists of the following parts: the user satisfaction analysis which concerns the identification of customer preferences and includes the estimation of the relative importance, and the satisfaction benchmarking analysis which is mainly focused on the performance evaluation of the

competitive organizations against the satisfaction criteria. The results presented how business organizations may locate their position against competition, reduce their weak points and determine which characteristics will improve their global performance. This gives the ability to identify the most critical improvement actions and adopt the best practices of the industry.

Abdel-Razek et al (2007) discussed the improving of construction labor productivity in Egypt by applying benchmarking for labor productivity performance. Labor productivity data was used from masonry activities on eleven building companies in Egypt, several measures of benchmarks of construction labor productivity were demonstrated, calculated, and then used to evaluate the productivity and identify the best and worst performing projects. Monch (2007) presented benchmarking efforts for production control approaches applied to complex manufacturing systems.

Requirements for benchmarking were derived from a modeling and from special software. Cavalieri et al (2007) provided a comprehensive view of benchmarking and performance measurement service for the evaluation and comparison of scheduling techniques. Luu et al (2007) presented how benchmarking approach can be applied to evaluate and improve the construction project management. A conceptual research framework was generally developed to perform a benchmarking study of the project management performance (PMP) from the contractor's viewpoint. It was remarked that benchmarking approach can help construction firms to learn from the best practices of others and carry out continuous improvement.

2.4 Project Management and Effective and Efficient Delivery of Road Construction Projects

There is a strong relation between project management and project performance. Management in construction industry is considered as one of the most important factors affecting performance of works. Brown and Adams (2006) studied a new approach to the measurement of the effect of Building Project Management (BPM) on time, cost and quality outputs using 15 `cases' derived from UK data. The evaluation undertaken demonstrates that BPM as it is presently implemented in the UK fails to perform as expected in relation to the three predominant performance evaluation criteria; time, cost and quality. Lehtonen (2001) obtained a model for performance measurement which assist both firms' top management and operational managers for continuous feedback on operational activities. Thomas (2002) stated that

documenting and archiving performance data could be useful for future reference, such as for settling disputes on claims, and in maintenance and repair works. Kuprenas (2003) remarked that quantification of the impacts of the project management processes are identified through three steps of analysis: comparison of summary statistics of design performance, proof of statistical significance of any differences and calculation of a least squares regression line of a plot of design performance measurement versus amount/application of project management as a means to quantify management influence to design phase cost performance.

Cheung et al (2004) studied the project performance related to project managers. It is remarked that development of a Web-based construction Project Performance Monitoring System (PPMS) can assist project managers in exercising construction project performance indicators and can help senior project management, project directors, project managers, etc., in monitoring and assessing project performance.

Pheng and Chuan (2006) stated that while project management is only one of the many criteria upon which project performance is contingent, it is also arguably the most significant as people formulating the processes and systems who deliver the projects. Ugwu and Haupt (2007) stated that an adequate understanding and knowledge of performance are desirable for archiving managerial goals such as improvement of institutional transformations, and efficient decision making in design, specification and construction, at various project-level interfaces, using appropriate decision-support tools. Ling et al (2007) investigated project management (PM) practices adopted by Singaporean construction firms. It was determined the performance level of their projects in China; identifies PM practices that led to better performance; and recommended key PM practices that could be adopted by foreign construction firms in China to improve project performance.

Success of construction projects depends mainly on success of performance. Many previous researches had been studied performance of construction projects. Dissanayaka and Kumaraswamy (2009) remarked that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system. Reichelt and Lyneis (2009) remarked three important structures underlying the dynamic of a project performance which are: the work accomplishment structure, feedback effects on productivity and work quality and effects from upstream phases to downstream phases. Thomas

(2002) identified the main performance criteria of construction projects as financial stability, progress of work, standard of quality, health and safety, resources, relationship with clients, relationship with consultants, management capabilities, claim and contractual disputes, relationship with subcontractors, reputation and amount of subcontracting.

Chan and Kumaraswamy (2002) stated that construction time is increasingly important because it often serves as a crucial benchmarking for assessing the performance of a project and the efficiency of the project organization. Cheung et al (2004) identified project performance categories such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication. It is obtained by Navon (2005) that a control system is an important element to identify factors affecting construction project effort. For each of the project goals, one or more Project Performance Indicators (PPI) is needed. Pheng and Chuan (2006) obtained that human factors played an important role in determining the performance of a project. Ugwu and Haupt (2007) remarked that both early contractor involvement (ECI) and early supplier involvement (ESI) would minimize constructability-related performance problems including costs associated with delays, claims, wastages and rework, etc. Ling et al (2007) obtained that the most important of practices relating to scope management are controlling the quality of the contract document, quality of response to perceived variations and extent of changes to the contract. It was recommended for foreign firms to adopt some of the project management practices highlighted to help them to achieve better project performance in China.

Ogunlana et al, (2006) recommended the need for focused effort by economy managers and construction industry associations to provide the infrastructure needed for efficient project management and performance. Dissanayaka and Kumaraswamy (2009) stated that the knowledge that would influence potential performance enables project managers to pay special attention to control performance more effectively. Chan and Kumaraswamy (2002) remarked that effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performance. Kuprenas (2003) studied the impact of the use of a project management based organizational structure, project manager training, frequency of design meetings, and frequency of design reports on design phase cost performance. The process of a design team meeting frequency and the process of written

reporting of design phase progress were found to be statistically significant in reducing design phase costs.

Navon (2005) stated that data are collected and used for construction managers as a basis to evaluate the project performance indicators (PPI) actual value to compare it with the planned value and forecast its future value based on past performance. Pheng and Chuan (2006) identified the importance of the working environment variables for the performance of a project manager in the private and public sectors according to three main groups which are job condition, project characteristic and organizational related categories. The result revealed that working hours, physical condition of project site, complexity of project, material and supplies, project size, duration of project and time availability were viewed differently in terms of importance by the contractors and consultants groups. Team relationship was ranked as the most important variable affecting the performance of a project manager. It is obtained that project managers' experiences do not have much effect on how they perceive their working environment.

2.5 Information Technology and Effective and Efficient Delivery of Road Construction Projects

Information technology technique is very important in the entire world. Information technology (IT) opens new visions in the businesses and industries performance of the world. The construction industry is considered as one of the industries using IT technique such as software management systems, database and communications. For many years, many processes, functions, operations were done difficulty because of absence of IT field. In addition, most of the work was done manually which lead to more cost, time and poor performance. Furthermore, IT usage in the construction industry leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance. There are many benefits and relations of using IT in the construction projects such as: greater use of IT correlates with better project performance, owners and contractors realize meaningful benefits, IT affects schedule compression beneficially, and overall project cost savings which lead to a success performance of project (Schwegler et al, 2001).

Nitithamyong et al (2004) remarked that information Technology (IT) is now routinely used in the construction industry as a tool to reduce some of the problems generated by

fragmentation. The use of IT improves coordination and collaboration between firms participating in a construction project, leading to better communication practices and so good performance. Its benefits include an increase in the quality of documents and the speed of the work, better financial control and communications, and simpler and faster access to common data as well as a decrease in documentation errors.

Thomas (2002) proposed contractor Performance Appraisal and Reporting (PAR) system for reviewing contractor performance at an organizational level. Advancements in World Wide Web techniques provide enhanced capacities to collect compile and disseminate performance-related information to various construction stakeholders in a timely and cost-effective manner. Becerik (2004) stated that the rapid advances of web-based project management and collaboration technology offer new opportunities to improve existing construction project performance. Cheung et al (2004) obtained framework software to measure project performance based on project performance measurement system (PPMS). The system contains four stages which are data entry, database, reporting and action. This system has eight categories to measure performance which are people, cost, time, quality, safety and health, environment, client satisfaction, and communication. Goh (2005) remarked that information technology management leads to performance improvement in the construction industries. For instance, in Singapore 2003, general administration, design, project management, site management were enhanced by using of IT. In addition, there were more advantages as quick working, good quality of work and fast access of information.

Samson and Lema (2002) remarked that characteristics of emerging performance measurement indicators need analysis of both the organization and environment such as: nature of work, global competition, quality awards, organizational role, external demands and power of IT. The indicators should be able to identify causes of problems, address all possible performance drivers, and identify potential opportunities for improvement. Stewart and Mohamed (2003) emphasized the importance of a structured evaluation framework to evaluate the value IT adds to the process of project information management. The framework is in the form of a Construct IT with IT performance perspectives and indicators developed specifically for managing information on construction projects. Therefore, construction organizations should lay the foundations for an IT performance measurement and management culture, by actively seeking to quantify the value IT generates.

Samson and Lema (2002) found that the traditional performance measurement systems have problems because of large and complex amount of information with absence of approaches to assist decision maker understand, organize and use such information to manage organizational performance. Navon (2005) remarked that traditional project performance control is usually generic (cost control techniques). It relies on manual data collection, which means that it is done at low frequency (normally once a month) and quite some time after the controlled event occurred (not in real-time). Moreover, manual data collection normally gives low quality data.

2.6 Time of Project Completion and Effective and Efficient Delivery of Road Construction Projects

Chan and Kumaraswamy (2002) remarked that studies in various countries appear to have contributed significantly to the body of knowledge relating to time performance in construction projects over the past three decades, while Iyer and Jha (2005) remarked that project performance in term of cost is studied since 1960s. These studies range from theoretical work based on experience of researcher on one end to structured research work on the other end. Moreover, Pheng and Chuan (2006) stated that there have been many past studies on project performance according to cost and time factors.

Chan and Kumaraswamy (2005) stated that a number of unexpected problems and changes from original design arise during the construction phase, leading to problems in time schedule and performance. It is found that poor site management, unforeseen ground conditions and low speed of decision making involving all project teams are the three most significant factors causing delays and problems of time performance in local building works. Okuwoga (2008) stated that cost and time performance has been identified as general problems in the construction industry worldwide. Dissanayaka and Kumaraswamy (2005) remarked that project complexity, client type, experience of team and communication are highly correlated with the time performance; whilst project complexity, client characteristics and contractor characteristics are highly correlated with the cost performance. Reichelt and Lyneis (1999) obtained that project schedule and budget performance are controlled by the dynamic feedback process.

Those processes include the rework cycle, feedback loops creating changes in productivity and quality, and effects between work phases. Chan (2001) identified that the best predictor of average construction time performance of public sector projects in Malaysia is T =

269 C 0.32. This relationship can serve as a convenient tool for both project managers and clients to predict the average time required for delivery of a construction project. Kuprenas (2003) stated that process of a design team meeting frequency and the process of written reporting of design phase progress were found to be statistically significant in reducing design phase costs. Otherwise, the use of project manager training and a project management based organizational structure were found to be processes that do not create a statistically significant in reducing design phase costs.

Iyer and Jha (2005) remarked that the factors affecting cost performance are: project manager's competence; top management support; project manager's coordinating and leadership skill; monitoring and feedback by the participants; decision making; coordination among project participants; owners' competence; social condition, economical condition and climatic condition. Coordination among project participants was as the most significant of all the factors having maximum influence on cost performance of projects. Love et al (2005) examined project time-cost performance relationships by using project scope factors for 161 construction projects that were completed in various Australian States. It is noticed that gross floor area and the number of floors in a building are key determinants of time performance in projects.

Furthermore, the results indicate that cost is a poor predictor of time performance. Chan and Kumaraswamy (2002) proposed specific technological and managerial strategies to increase speed of construction and so to upgrade the construction time performance. It is remarked that effective communication, fast information transfer between project participants, the better selection and training of managers, and detailed construction programs with advanced available software can help to accelerate the performance. Jouini et al (2004) stated that managing speed in engineering, procurement and construction projects is a key factor in the competition between innovative firms. It is found that customers can consider time as a resource and, in that case, they will encourage the contractor to improve the time performance.

Karim and Marosszeky (2009) defined the purpose of KPI's as to enable a comparison between different projects and enterprises to identify the existence of particular patterns. Dissanayaka and Kumaraswamy (2009) used different representation values to evaluate time and cost performance such as project characteristics, procurement system, project team performance, client representation's characteristics, contractor characteristics, design team characteristics,

external condition. Karim and Marosszeky (2009) stated that the development and use of key performance indicators (KPI's) can help to identify dysfunctional in the procurement process. Karim and Marosszeky (2009) studied the development of key performance indicators to measure performance such as cost of pricing the tender as a percentage of contract value, cost of pricing the tender as a percentage of contract value, no. of times base tender price changed, time from the first tender to actual award of contract, average delay in payment of base claim, average delay in payment of agreed variations, average time for approval of agreed variations.

2.7 Theoretical Framework

This study will employ stakeholder's theory which as a field of research, has tended to focus on planning and managing the complex array of activities required delivering a construction project, such as a road or building. Interest in stakeholders has grown considerably since Freeman's (1984) seminal work Strategic Management: A Stakeholder Approach was published. Over 100 articles were published on 'stakeholder theory' by 1995 (Donaldson & Preston 1995, p. 65), with many more published since. Increasingly the notion of stakeholder has gained purchase in academic texts, media and government publications (Friedman & Miles 2002).

As interest in stakeholder concepts has increased, so too has the number of views on the subject (Friedman & Miles 2002). Some attempts at harmonisation of disparate views have been made with Jones' (1995) summary the most widely accepted. Jones (1995) argues that stakeholder theory can be divided into three main approaches: descriptive approaches, which depict "what happens", instrumental approaches which outline "what happens if", and normative approaches which suggest "what should happen". While having its' origins in strategic management, stakeholder theory has been applied to a number of fields of enquiry including corporate social responsibility (Hillman and Keim 2001) and more recently construction project management (Bourne and Walker 2005). This review will focus on the utility of stakeholder theory for examining multiple stakeholders in the implementation of public works procurement. In response, Freeman and McVea (2001) called for future stakeholder research to eschew theoretical debate, and instead use stakeholder theory's insights to examine real world problems.

Construction management, as a field of research, has tended to focus on planning and managing the complex array of activities required delivering a construction project, such as a

road or building (Freeman & McVea, 2001). Being able to manage construction stakeholders expectations and concerns is a crucial skill for managers of construction projects as failure to address these has resulted in countless project failures (Bourne & Walker 2005), primarily because construction stakeholders tend to have the resources and capability to stop construction projects (Lim et al. 2005). Successful completion of construction projects is therefore dependant on meeting the expectation of stakeholders. Stakeholders, include clients, project managers, designers, subcontractors, suppliers, funding bodies, users, owners, employees and local communities. As a consequence a robust construction management literature has developed on how to identify and manage stakeholder interests and relationships. This research proposal follows this call by using stakeholder theory to examine factors influencing effective and efficient delivery of road construction projects in Kenyawith focus to Nairobi county road contractors.

2.8 Conceptual Framework.

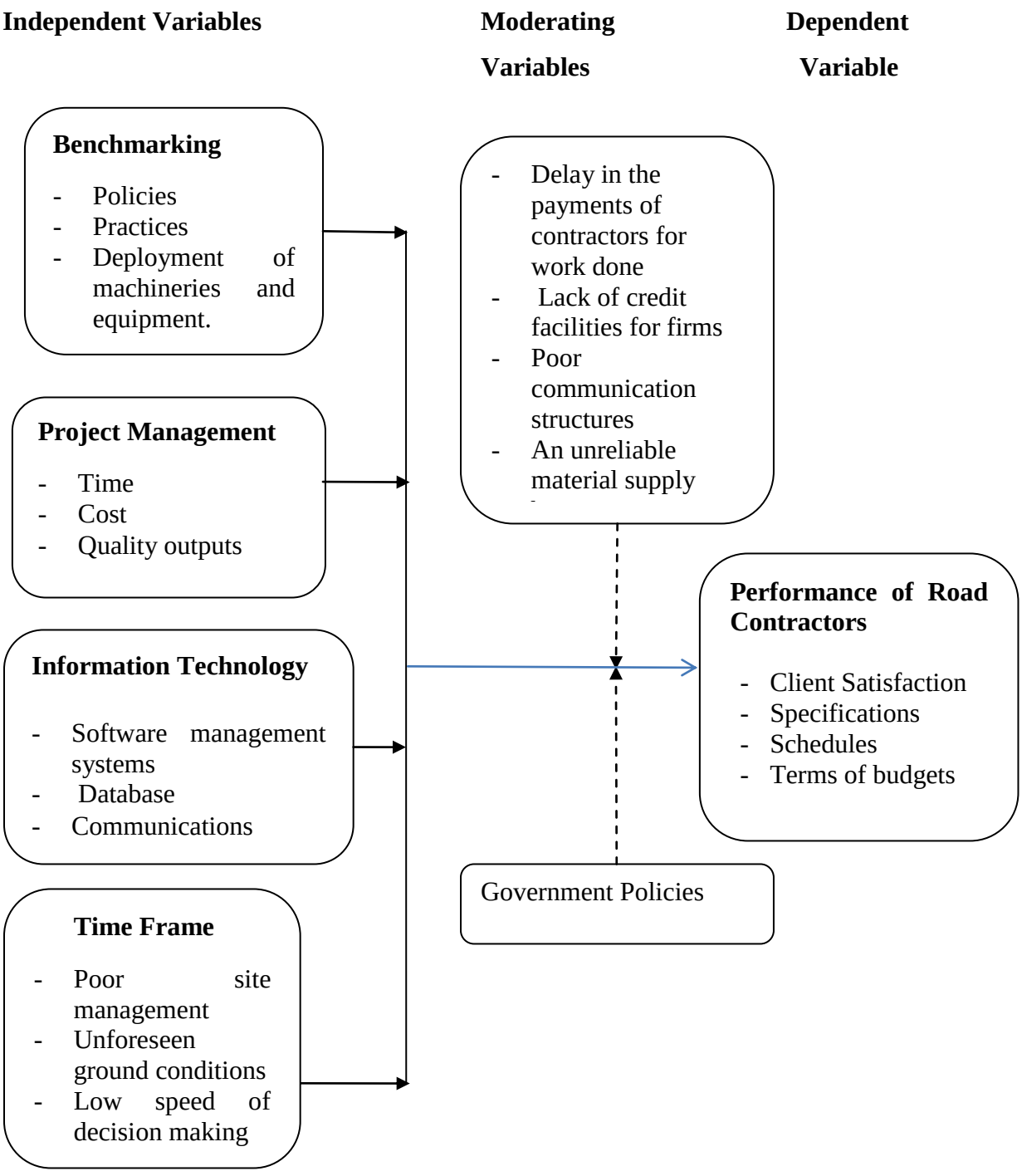

Figure 1. Conceptual Framework

2.9 Research gap

The literature available have identifies numerous potential factors that could affect the performance of contractors on construction projects. For instance, qualitative evidence provided by Edmonds and Miles (2004) and Ofori (2004) almost a decade ago revealed chronic delay in the payments of contractors for work done, lack of credit facilities for firms, poor communication structures and an unreliable material supply base. Using quantitative analysis, Ahadzie (2005) also reported evidence of lack of finance and credit facilities for contractors, delay in the payment of contractors for work done, design changes and/or variations, low morale and motivation of craftsmen, poor planning, supervision and low mechanization, as some of the important factors that could be affecting construction industry performance.

In their procurement of audit of Ghana, the World Bank (2003), have continuously reported documentary evidence of contracts taking very lengthy periods to reach financial closure and also, often subjected to unnecessary delays, poor coordination and communication structures, fiscal constraints and extensive systems of controls and land ownership disputes. In a recent study, Fugar and Agyarkwa-Baah (2010) synthesized a number of these factors towards highlighting their relevance in contemporary Ghanaian construction practice. They concluded that the factors affecting construction performance could be classified under the following themes: materials, manpower, equipment, financing, environment, changes, government action, contractual relationships and scheduling and controlling techniques.

Indeed, there is a lot of popular literature on factors affecting construction performance in developing countries. Although these significant bodies of knowledge exist in the emerging economy context, extant review of the literature suggests that there is a lack of rigorous theoretical and empirical examination to establish the underlying characteristics of the numerous factors identified in the literature, especially with regard to the Effective and Efficient Delivery of Road Construction Projects. It is contended that, given that Road Contractors account for over 95% of building firms operating in the construction industry and also in financial terms contributing substantially to construction GDP at decentralized and Local Government areas in Kenya, their evaluation of the knowledge of the factors influencing their performance in the industry could be useful in developing a framework towards effective performance management and improvement in a very crucial sector. Thus this study will seek to bridge this knowledgeable

gap by investigate factors influencing effective and efficient delivery of road construction projects in Kenya with focus to Nairobi county road contractors.

2.10 Summary of Literature Review

This chapter looked at in the literature review which included the discussion of previous studies done by other scholars in relation to factors influencing effective and efficient delivery of road construction projects in Kenya with focus to Nairobi county road contractors. Koskela (2000) showed that there was a relationship between a reduction of productivity and the incidence of waste in construction. Poor quality was identified by Koskela (2000) as one of the major factors causing low productivity. Some researchers experienced the high amount of poor quality in construction. Cnudde (1991) argued that the cost of poor quality (non-conformance), as measured on-site has turned out to be 10-20% of the total project cost. In an American study of several industrial projects, deviation costs averaged 12.4% of the total installed project cost (Burati *et al*., 1992). The causes of these quality problems are attributed to design, 78%, and to construction at 17%. A study in Indonesian construction industry (Alwi, 1995) found that poor quality of labour skills contributed 3.2% of the total project costs.

From the available literature, Li et al (2006) stated that cooperative benchmarking should be used as a tool for achieving partnering excellence in construction projects. Benchmarking involves a comparative analysis between at least two parties in order to compare the current performance gap. Tolosi (2000) stated that benchmarking is coming into increasing use in telecoms by management, regulators and offers potential for many useful applications. However, benchmarking must be used with caution, and its design as a tool of analysis must be thoughtfully considered in order to achieve accurate and meaningful indicators. Lehtonen (2001) obtained a model for performance measurement which assist both firms' top management and operational managers for continuous feedback on operational activities. Thomas (2002) stated that documenting and archiving performance data could be useful for future reference, such as for settling disputes on claims, and in maintenance and repair works. IT usage in the construction industry leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance. Nitithamyong et al (2004) remarked that information Technology (IT) is now routinely used in the construction industry as a tool to reduce some of the problems generated by fragmentation. The use of IT improves coordination and collaboration

between firms participating in a construction project, leading to better communication practices and so good performance. Chan and Kumaraswamy (2005) stated that a number of unexpected problems and changes from original design arise during the construction phase, leading to problems in time schedule and performance. Reichelt and Lyneis (1999) obtained that project schedule and budget performance are controlled by the dynamic feedback process.

The chapter also presented theoretical review; the study was grounded on stakeholder's theory which as a field of research, has tended to focus on planning and managing the complex array of activities required delivering a construction project, such as a road or building. This theory explain that being able to manage construction stakeholders expectations and concerns is a crucial skill for managers of construction projects as failure to address these has resulted in countless project failures. The study also represents the conceptual framework by explain relationship between independent variables and dependent variable.Finally, the study analysis the summary of the study as per each theme while no study has been done on effective and efficient delivery of road construction projectslocally. Therefore, research is required to investigatefactors influencing effective and efficient delivery of road construction projects in Kenyawith focus Nairobi County.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter encompasses the research methodology that was used in the field. It focuses on the sources of data and their collection techniques sampling procedure to be adapted and tools for data presentation and interpretation. This chapter focused on the research design, study population, sample and sampling procedure, data collection and data collection procedures, validity and reliability of research instruments and data analysis techniques.

3.2 Research Design

Research design is the scheme, outline or plan that is used to generate answers to research problems. This research problem will be studied through the use of descriptive research design. According to Kothari (2007) descriptive survey research design is a type of research used to obtain data that can help determine specific characteristics of a group. A descriptive survey involves asking questions (often in the form of a questionnaire) of a large group of individuals either by mail, by telephone or in person. The main advantage of descriptive survey research is that it has the potential to provide us with a lot of information obtained from quite a large sample of individuals. By employing this study design, this study focused on obtaining quantitative data from a cross-section of project members.

3.3 Target Population

Target population as described by Borg and Grall (2009) is a universal set of study of all members of real or hypothetical set of people, events or objects to which an investigator wishes to generalize the result. The target population of this study were road contractors in Nairobi County while the study population were government representatives from the Ministry of Roads, Contractors (supervisors in the projects), consultant (technical consultant by contractors), and Engineers from Nairobi County and technical auditors participating in road contractors projects in Nairobi County. Mugenda and Mugenda (2003) explained that the target population should have observable characteristics to which the study intents to generalize the result of the study. This definition assumes that the population is not homogeneous.

Table 3.1 Study Population

	Frequency	Percentage
Contractors	58	54
Contractor consultants	28	27
Ministry of road engineer	10	8
Engineers from Nairobi county	7	7
Technical auditors	5	4
Total	**106**	**100**

3.4 Sampling and Sample Size

This section presented the methods and techniques that were used for sampling, the procedure of sampling and eventually how the final study sample was reached from the target population and the details of how data was obtained, processed and analyzed.

3.4.1 Sample Size

The sampling frame describes the list of all population units from which the sample will be selected (Cooper & Schindker, 2003). Sampling is selecting a given number of subjects from a defined population as representative of that population. From the target population of twenty eight (28) road contractor registered with ministry of road, the researcher purposively interviewed specific respondents working in specific area concerned in Nairobi County. These respondents having been in construction sector and directly working in departments perceived to be oriented in dealing with road maintenance and construction therefore aligned to the study research objectives.

3.4.2 Sampling Procedure

The sampling procedure describes the list of all population units from which the sample will be selected (Cooper & Schindler, 2003). The study employed census to interview construction firm since the number is small. Sample of responding staff were drawn from all construction in Nairobi where stratified random sampling technique was employed in coming up with a sample size of 42 respondents from a total of 106 respondents from specific individual concerned in road maintenance and building within Nairobi county namely; contractors, contractor consultants, Ministry of Roads Engineers, Engineers from Nairobi County and Technical Auditors. Gay (2001) pointed that a sample of 10-40% is representative. In this study, 40% of the sample was considered. The technique was applied so as to obtain a representative sample when the population does not constitute a homogeneous group. In stratified random

sampling subjects are selected in such a way that the existing sub-groups in the population are more or less represented in the sample (Mugenda & Mugenda, 2003).

Table 3.2 Sampling and Sample Size

	Frequency	Sample size	Percentage
Road Contractors	58	23	54
Contractor consultants	28	11	27
Ministry of Roads Engineers	8	3	8
Engineers from Nairobi City County	7	3	7
Technical Auditors	5	2	4
Total	**106**	**42**	**100**

3.5 Research Instruments

The instruments to be used in this study include questionnaires. Primary data was collected by the use of questionnaires. The questionnaires were used to collect data from the respondents in the Nairobi County. The questionnaire was divided into two sections; Part A which sought to establish personal details of the respondent and Part B which contained specific objectives of the study. The structured questions were used in an effort to conserve time and money as well as to facilitate in easier analysis as they are in immediate usable form.

3.5.1 Piloting the Research Instruments

The questionnaires were reviewed by the researcher's professional peers and the research supervisor and then tested on a small pilot sample of respondents with similar characteristics as the study respondents. The pilot sample consisted of 10 staffs involved in road construction which were selected randomly. Mugenda and Mugenda (2003) suggest that the piloting sample should represent 10% of study sample depending on the study sample size. The piloting was done in Nairobi County. Piloting helps in revealing questions that could be vague which allows for their review until they convey the same meaning to all the subjects (Mugenda and Mugenda, 2003).

3.5.2 Validity of the Research Instruments

Validity is the quality of a data gathering instrument that enables it to measure what it is supposed to measure. Creswell (2003) notes that validity is about whether one can draw

meaningful and useful inferences from scores on the instrument. Validity is therefore about the usefulness of the data and not the instrument. To ensure content validity, the instruments were reviewed by the research supervisors and other research experts. Content validity yields a logical judgment as to whether the instrument covers what it is supposed to cover. Content validity ensured that all respondents understand the items on the questionnaire similarly to avoid misunderstanding. Response options were provided for most of the questions to ensure that the answers given are in line with the research questions they are meant to measure.

3.5.3 Reliability of Research Instruments

Reliability is concerned with the question of whether the results of a study are repeatable. A construct composite reliability co-efficient (Cronbach alpha) of 0.6 or above, for all the constructs, was considered to be adequate for this study. The acceptable reliability coefficient is 0.6 and above (Rousson, Gasser and Seifer, 2002). Cronbach Alpha was used to test the reliability of the research instrument.

3.6 Data Collection Procedure

After approval of the Proposal by the University of Nairobi to collect data, the researcher will coordinate data collection process after seeking permission from Nairobi City County. The researcher engaged three research assistants who will assist in data collection. The research assistants were taken through training to clearly understand the research instruments, purpose of the study and ethics of research. The researcher and research assistants administered the questionnaires to the respondents face to face.

3.7 Data Analysis Techniques

The study generated both qualitative and quantitative data. Quantitative data was coded and entered into Statistical Packages for Social Scientists (SPSS Version 17.0) and analyzed using descriptive statistics. Qualitative data was analyzed based on the content matter of the responses. Responses with common themes or patterns were grouped together into coherent categories.

Descriptive statistics involves use of absolute and relative (percentages) frequencies, measures of central tendency and dispersion (mean and standard deviation respectively). Quantitative data was presented in tables and graphs and explanation was presented in prose. In

addition, the researcher used multiple regression analysis to establish the strength of the relationship between the dependent and independent variables.

The regression equation is:

$$Y= \beta 0+ \beta 1X1+\beta 2X2+ \beta 3X3+ \beta 4X4 +\alpha$$

Where: Y is the dependent variable (performance of Road Contractors),

$\beta 0$ is the regression coefficient/constant/Y-intercept,

β_1, β_2, β_3, β_4 and β_5 are the slopes of the regression equation,

X_1 is Benchmarking

X_2 is Project Management

X_3 is Information Technology

X_4 is Time

α is an error term normally distributed about a mean of 0 and for purpose of computation, the α is assumed to be 0.

3.8 Ethical Considerations

While conducting the study, the researcher ensured that research ethics are observed. Participation in the study will be voluntary. Privacy and confidentiality was observed. The objectives of the study were explained to the respondents with an assurance that the data provided were used for academic purpose only.

3.9 Operational definition of variables

The operationalization of variables is as shown in table 3 below;

Table 3.3: **Operationalization of Variables**

Objectives	**Independent Variables**	**Indicators**	**Measurement Scale**	**Type of analysis**	**Tools of analysis**
To establish the influence of benchmarking on effective and efficient delivery of road cosntruction projects in Kenya	Benchmarking	- Policies used	Nominal	Descriptive Regression	Frequency distribution tables, Tabulation & percentages
		- Practices employed	Nominal		
		- Deployment of equipment	Nominal		
		- Strategies	Ordinal		
		- Operation framework	Nominal		
		- Identification of industry leaders	Nominal		
		- Application of new knowledge	Nominal		
		- Achievement of objectives	Ordinal		
		- Identification of the competitive advantages	Ordinal		

Objectives	**dependent Variable**	**Indicators**	**Measurement Scale**	**Type of analysis**	**Tools of analysis**
To examine the influence of project management on effective and efficient delivery of road construction projects in Kenya a	Project management	- Time	Nominal	Regression	Frequency distribution tables, Tabulation & percentages
		- Cost	Nominal		
		- Quality outputs	Nominal		
		- Performance measures	Nominal		
		- Feedback	Nominal		
		- Control system	Nominal		
		- Human factors	Nominal		
		- Construction related performance problems	Nominal		
		- Quality control	Nominal		
		Communication	Ordinal		

Objectives	dependent Variable	Indicators	Measurement Scale	Type of analysis	Tools of analysis
To assess how Information technology adoption influence effective and efficient delivery of road construction projects in Kenya	Information Technology	- Creativity and Innovation	Ordinal	Regression	Frequency distribution tables & percentages
		Speedy operation	Nominal		
		- Software management systems	Ordinal		
		- Database	Ordinal		
		- Communications	Ordinal		
		- Ease process and procedure of operation	Ordinal		
		- Strategic change	Ordinal		
		- Connectivity between branches	Nominal		
		- Coordination	Ordinal		
		- Identification of new opportunities	Nominal		
		- Accuracy	Ordinal		

Objectives	dependent Variable	Indicators	Measurement Scale	Type of analysis	Tools of analysis
To establish how time of project completion influence effective and efficient delivery of road construction projectsin Kenya	Time of project completion	- Poor site management	Nominal	Regression	Frequency distribution tables, Tabulation & percentages
		- Unforeseen ground conditions	Nominal		
		- Low speed of decision making	Nominal		
		Staff turnover	Nominal		
		Training & induction	Ordinal		
		Delivery time	Ordinal		
		Implementation of variation orders	Ordinal		
		Payment factor	Ordinal		
		Resources availability	Nominal		
		Material shortage	Ordinal		
	Effective and efficient delivery of road construction projects in Kenya	Return on assets	Nominal	Regression	Frequency distribution tables, Tabulation & percentages
		Surplus Or Net Profit	Nominal		
		Turnover	Nominal		

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter focused on the data analysis, interpretation and presentation of the findings. The main purpose of this research was to examine factors influencing effective and efficient delivery of road construction projects in Kenya with focus to Nairobi County. The study also sought to establish whether benchmarking, project management, Information technology on effective and efficient delivery of road construction projects in Kenya and time of project completion on effective and efficient delivery of road cosntruction projects in Kenya. The researcher made use of frequency tables, percentages, mean and standard deviation to present data.

4.2 Questionnaire Return Rate

The study sampled 42 respondents from the target population of 106 in collecting data with regard to factors influencing effective and efficient delivery of road construction projects where the focus was road contractors in Nairobi County. The questionnaire return rate results are shown in Table 4.1.

Table 4.1 Response Rate

Response	Frequency	Percentage
Responded	31	74
Non response	11	26
Total	**42**	**100**

From the study, 31 out of 42 targeted respondents filled in and returned the questionnaire contributing to 74%. This commendable response rate was attributed to the data collection procedure, where the researcher engaged three researcher assistants' to administer questionnaires and waited for respondents to fill in, while respondents left with questionnaires were reminded to fill in the questionnaires through frequent phone calls and picked the questionnaires once fully filled. Any clarifications sorted by the respondents were accorded to without delay.This response rate was good, representative and conforms to Mugenda and Mugenda (1999) stipulation that a response rate of 50% is

adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. The questionnaires that were not returned were due to respondents not being available to fill them in time and after persistence follow-ups, there were no positive feedback from them. The response rate demonstrated the willingness of the respondents to participate in the study.

4.3 Demographic Characteristics of the Respondents

The study targeted staffs from Road contractors in Nairobi City County specifically targeting Contractors, Contractor consultants, Ministry of Road Engineers, Engineers from Nairobi City County and Technical Auditors. As such the results on demographic characteristics of these respondents were investigated in the first section of the questionnaire. They are presented in this section under; department they work, position held in the organization, period in years worked in the organization and highest academic qualifications.

4.3.1 Position Held by the Respondents

Table 4.2 indicates position held by the respondents in the organization of working. From the findings most (47%) of the respondents were contractors, 31% were serving as consultants, 6% were working as Ministry of Roads Engineers, Nairobi City County Engineers and Technical Auditors as shown in each case. This implies that all departments that were targeted by the study were involved and that the findings are not biased.

Table 4.2 Position held by the Respondents

Position of respondents	Frequency		Percentage Response
	Responded	Non response	
Contractor	15	8	47
Consultant	10	1	31
Ministry of Roads Engineers	2	1	6
Nairobi City County Engineers	2	1	6
Technical Auditors	2	0	6
Totals	**31**	**11**	**100**

4.3.4 Period of Service in Years in Construction Industry

Table 4.3 illustrates working period in years of the respondents in their respective organization. From the findings most (36%) of the respondents had worked in the organization for a period of above 16 years, 32% had worked for a period of 1-5 years,23% had worked for a 6-10years while the rest (10%) had served in the organization for a period of 11-15 years. This implies that most of the respondents of this study had worked for a longer period within the organization thus they are conversant enough of the information that the study sought pertaining to the organization performance.

Table 4.3 Period of Service (in Years) in Construction Industry

Years of service	Frequency	Percent
1- 5 years	10	32.3
6 – 10 years	7	22.6
11 – 15 years	3	9.7
Above 16 years	11	35.5
Total	**31**	**100.0**

4.3.5 Education Level of the Respondents

The study was also inquisitive to determine the highest level of the academic qualification that the respondent held. Table 4.4 shows the findings of the result, most (61%) of the respondents were undergraduate, 23% were post graduates (masters holder) while the rest (16%) had diploma as their highest level of education. This depictedthat

most of the respondents interviewed were well knowledgeable to understand and able to respond to the questionnaire in the manner intended.

Table 4.4 Education Level of the Respondents

Education Level	Frequency	Percent
Post Graduate	7	22.6
Diploma	5	16.1
Undergraduate	19	61.3
Total	**31**	**100.0**

4.3.6 Main Clients of Road Contractors

The researcher also requested the respondent to indicate main clients they offer service to. According to the findings as shown in table 4.5, majority (68%) of the respondents indicated that they were serving public while the rest (32%) were serving privates sectors. This implies that most of contractors were targeting government and other public institution to maintain and build roads.

Table 4.5 Main Clients of Contractors

Clients	Frequency	Percent
Private Sector	10	32.3
Public	21	67.7
Total	**31**	**100.0**

4.3.7 Involvement in Road Construction

The study findings enquired on whether the construction company had been involved in road constructions. From the findings, all (100%) of the respondents indicated that they had been involved in road construction. This illustrates that all the construction involved in the study had been involved in road construction.

4.4 Benchmarking

4.4.1 Use of benchmarking as a Strategy of Improving Organization Performance

Benchmarking has been used by most of organization in reengineering their performance, construction companies were not excluded in the practices. As such the

study aimed at establishing whether they use it as a strategy of improving their performance. From the findings as shown in table 4.6, majority (81%) were of the opinion that they use benchmarking as a Strategy of improving organization performance while the rest (19%) opined otherwise.

Table 4.6 Benchmarking as a Strategy of Improving Organization Performance

Use of benchmarking	Frequency	Percentage
Yes	25	80.6
No	6	19.4
Total	**31**	**100.0**

4.4.2 Benchmarking and its Influence on Organization Performance

Table 4.7 illustrates the finding of the study on the respondent level of agreement to the statement relating to benchmarking and its influence on organization performance. From the findings, most of the respondents agreed they employ benchmarking as a tool for achieving partnering excellence in construction projects and that benchmarking approach is used in our organization in order to determine the organizational strong and weak points, to evaluate its performance, to identification the competitive advantages and disadvantages and to know the improvement priorities for each performance and continued acquiring and applying new knowledge ensure long term benefits which are somewhat eluding us at present indicator as shown by mean score of 4.71, 4.35 and 4.26 respectively. Further, respondents agreed that Our organization use benchmarking since is a good development tool because it enforces a self-critical approach, indicating the points of operation the company must improve, benchmarking aims to identify industry leaders, who demonstrate superior performance by using best construction practices, benchmarking helps our company to define the best possible indicators for comparison and to obtain a picture of the company's entire operation and that it provides a framework to check, how a particular construction company compares with the rest of the industry as illustrated by mean score of 3.72, 3.69, 3.59 and 3.57 respectively.

Table 4.7 Benchmarking and its Influence on Organization Performance

Statements	Mean	STDev
It provides a framework to check, how a particular construction company compares with the rest of the industry	3.57	1.431
Benchmarking aims to identify industry leaders, who demonstrate superior performance by using best construction practices.	3.69	1.014
Continued acquiring and applying new knowledge ensure long term benefits which are somewhat eluding us at present	4.26	0.773
Benchmarking is a good development tool because it enforces indicating the points of operation the company must improve	3.72	1.270
Benchmarking as a tool for achieving partnering excellence in construction projects	4.71	0.402
Benchmarking helps our company to define the best possible indicators for comparison.	3.59	0.873
Benchmarking approach is used in our organization in order to determine the organizational strong performance and to know the improvement priorities for each performance indicator	4.35	1.226

4.3.3 Extent that Benchmarking Affect Organization Performance

Further the researcher requested the respondent to indicate the extent that benchmarking affect organization performance. Table 4.8 shows that majority (65%) of the respondents' purported that benchmarking affect organization performance to a great extent, 19% were of the opinion that benchmarking affect organization performance to a very large extent, 13% opined that benchmarking affect organization performance to a moderate extent while3% were of the opinion that benchmarking affect organization performance to a low extent.

Table 4.8 Extent that Benchmarking Affect Organization Performance

Extent that Benchmarking	Frequency	Percent
Low extent	1	3.2
Moderate extent	4	12.9
Great extent	20	64.5
Very great extent	6	19.4
Total	**31**	**100.0**

4.5 Project Management

4.5.1 Effect of Project Management on Contractors Performance

The study requested the respondents to indicate whether project management influence road contractor's performance. From the findings, all (100%) indicated that project management influence road contractor's performance and that there exist relationship between the two.

4.5.2 Project Management and Performance Contractors

Table 4.9 summarizes the study findings on respondents' level of agreement to the statement that project management affects constructors' performance. From the findings most of the respondents agreed that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement systemas depicted by mean score of 4.06. Also respondents agreed that Effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performance as illustrated by mean score of 3.97. Likewise, the study respondents agreed that human factors play an important role in determining the performance of a project in our organization, management are controlling the quality of the contract document, quality of response to perceived variations and extent of changes to the contract and that control system is an important element to identify factors affecting construction project effort as depicted by mean score of 3.74, 3.71 and 3.68 respectively. Finally, respondent were neutral that the work accomplishment structure, feedback effects on productivity and work quality and effects from upstream phases to downstream phases and construction

related performance problems including costs associated with delays, claims, wastages and rework as shown by mean score of 3.39 and 3.32 respectively.

Table 4.9 Project Management and Performance Contractors

Statement	Mean	STDev
One of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system	4.06	0.680
The work accomplishment structure, feedback effects on productivity and work quality and effects from upstream phases to downstream phases	3.39	0.615
Control system is an important element to identify factors affecting construction project effort	3.68	0.475
Human factors play an important role in determining the performance of a project in our organization.	3.74	0.445
Construction related performance problems including costs associated with delays, claims, wastages and rework	3.32	0.791
Management are controlling the quality of the contract document, quality of response to perceived variations and extent of changes to the contract.	3.71	0.864
Effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performance	3.97	0.180

4.5.3 Extent that Project management affect Project Construction

Further the study requested the respondents to indicate the extent to which project management affect project construction. From the findings as shown in table 4.10, 45% of the respondents opined that project management affect project construction to very great extent and to a great as shown in each case while the rest (10%) were of the opinion that project management affect project construction to a moderate extent.

Table 4.10 Extent that Project management affect Project Construction

Extent	Frequency	Percentage
To a moderate extent	3	9.7
To a great extent	14	45.2
To a very great extent	14	45.2
Total	**31**	**100.0**

4.6 Information Technology

4.6.1 Application of Information Technology on Organization Performance

The study requested the respondent to indicate whether they apply IT in their operation as a mean of improving their performances. Unanimously, that is 100% of the respondents' indicated that apply IT in their operation as a mean of improving their performances. Table 4.11 shows that majority (87%) of the respondents pointed that IT ease the process and procedure of operation while 13% indicated that IT does not ease the process and procedure of operation.

Table 4.11 Application of Information Technology on Organization Performance

IT application	Frequency	Percent
Yes	27	87.1
NO	4	12.9
Total	**31**	**100.0**

4.6.2 Information Technology and Organization Performance

Further the researcher requested the respondents to indicate their level of agreement on the statement relating to information technology and organization performance. From the findings most of the respondents strongly agreed that IT usage has leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance, IT performance measurement systems have problems because of large and complex amount of information with absence of approaches to assist decision maker understand, organize and use such information to manage organizational performance and that their organization consider IT technique such as software management systems, database and communications in its operation as depicted by mean score of 3.94, 3.84 and 3.82 respectively as shown in table 4.12. Respondents' agreed that Information technology management leads to performance improvement in the construction industries and that IT improves coordination and collaboration between firms participating in a construction project, leading to better communication practices and so good performance as indicated by these mean scores 3.77 and 3.68 respectively.

Likewise respondents were neutral that Rapid advances of web-based project management and collaboration technology offer new opportunities to improve existing construction project performance, for many years, many processes, functions and operations were done difficulty because of absence of IT field and that they have accrued many benefits by using IT in the construction projects such as: greater use of IT correlates with better project performance, owners and contractors realize meaningful benefits, IT affects schedule compression beneficially, and overall project cost savings which lead to a success performance of project as depicted by mean score of 3.49, 3.35 and 3.19 respectively.

Table 4.12 Information Technology and Organization Performance

Statement	**Mean**	**STDev**
Our organization consider IT technique such as software management systems, database and communications in its operation	3.81	1.014
For many years, many processes, functions and operations were made difficulty because of absence of IT field	3.35	0.486
IT usage has leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance	3.94	0.250
We have accrued many benefits by using IT in the construction projects such as: greater use of IT correlates with better project performance, owners and contractors realize meaningful benefits, IT affects schedule compression beneficially, and overall project cost savings which lead to a success performance of project	3.19	1.167
IT improves coordination and collaboration between firms participating in a construction project, leading to better communication practices and so good performance	3.68	0.475
Rapid advances of web-based project management and collaboration technology offer new opportunities to improve existing construction project performance	3.45	0.568
Information technology management leads to performance improvement in the construction industries	3.77	0.425
IT performance measurement systems have problems because of large and complex amount of information with absence of approaches to assist decision maker understand, organize and use such information to manage organizational performance	3.84	1.186

4.6.3 Extent that IT determines Organization Performance

Table 4.13 illustrates the findings of the study on the influence of IT on road contractors' performance. Majority (41.3%) of the respondents' purported that state of IT influences contractors' performance to a great extent, 19% pointed that IT influence contractors' performance to a very great extent, 16% opined to a moderate extent, 13% to a low extent while the rest 10% opined that IT influence contractors' performance to a very low extent.

Table 4.13 Extent that IT determines Organization Performance

Extent	Frequency	Percent
To a very low extent	3	9.7
To a low extent	4	12.9
To a moderate extent	5	16.1
To a great extent	13	41.9
To a very great extent	6	19.4
Total	**31**	**100.0**

4.7 Time

4.7.1 Effect of Time on Effective and Efficient Delivery of Road Construction Projects

Further the researcher aimed to investigate whether time affects Effective and Efficient Delivery of Road Construction Projects. From the findings, all 100% of the respondents indicated that time affects Effective and Efficient Delivery of Road Construction Projects. This implies that time influences road contractors hence organization consider it.

4.7.2 Time Factor and Effective and Efficient Delivery of Road Construction Projects

Table 4.14 summarizes the study finding on respondent level of agreement on the statement relating to time factor and its effect on the Effective and Efficient Delivery of Road Construction Projects. From the findings most of the respondents agreed that availability of resources as planned through project duration average delay in payment

from owner to contractor, planned time for project construction and site preparation time influence effective and efficient delivery of road construction projectsas depicted by mean score of 4.35, 4.29, 4.16 and 4.13 respectively. Respondents' agreed that Bank with proactive workforce planning ensures optimum manpower utilization and that bank with poor staff discipline is less productive and accrue losses influence effective and efficient delivery of road construction projectsas indicated by these mean scores 4.47, 4.37 respectively. Respondents also agreed that percentage of orders delivered late, time needed to rectify defects and that average delay in claim approval influence effective and efficient delivery of road construction projectsas shown by mean score of 3.87, 3.74 and 3.65 respectively. Finally respondents were neutral that average delay because of closures and materials shortage and time needed to implement variation order influence effective and efficient delivery of road construction projectsas depicted by mean score of 3.42 and 3.35 respectively.

Table 4.14 Time Factor and Effective and Efficient Delivery of Road Construction Projects

Time	Mean	STDev
Site preparation time	4.13	0.922
Planned time for project construction	4.16	1.068
Percentage of orders delivered late	3.87	1.024
Time needed to implement variation orders	3.35	1.226
Time needed to rectify defects	3.74	1.210
Average delay in claim approval	3.65	1.226
Average delay in payment from owner to contractor	4.29	1.189
Availability of resources as planned through project duration	4.35	0.839
Average delay because of closures and materials shortage	3.42	1.119

4.7.3 Extent that time Influence Road Contractors Performance

Table 4.15 shows results of the findings on the extent to which time influence road contractors performance. From the findings, (36%) of the respondents were of the opinion that time Influence Road Contractors Performance to a very great and great

extent as shown in each case while 29% alleged that time influence road contractors performanceto a moderate extent.

Table 4.15 Extent that time Influence Road Contractors Performance

Description	Frequency	Percent
To a moderate extent	9	29.0
To a great extent	11	35.5
To a very great extent	11	35.5
Total	**31**	**100.0**

4.8 Inferential Analysis

4.8.1 Coefficient of Correlation

To compute the correlation (strength) between the study variables and their findings the researcher used the Karl Pearson's coefficient of correlation (r). From the findings as shown in table 4.16, it was clear that there was a positive correlation between effective and efficient delivery of road construction projectsand benchmarking as shown by a correlation figure of 0.523, it was also clear that there was a positive correlation between effective and efficient delivery of road construction projectsand project management with a correlation figure of 0.614, there was also a positive correlation between effective and efficient delivery of road construction projectsand Information technology with a correlation value of 0.746 and a positive correlation between effective and efficient delivery of road construction projectsand time frame with a correlation value of 0.521. This shows that there was a positive correlation between effective and efficient delivery of road construction projectsand benchmarking, project management, information technology and time frame.

Table 4.16 Coefficient of Correlation

		Effective and efficient delivery of road	Benchmarking	Project Management	Information Technology	Time Frame
Effective and efficient delivery of road construction projects	Pearson Correlation	**1**				
	Sig. (2-tailed)					
Benchmarking	Pearson Correlation	.523	1			
	Sig. (2-tailed)	.0032				
Project Management	Pearson Correlation	.6140	.3421	1		
	Sig. (2-tailed)	.0021	.0014			
Information technology	Pearson Correlation	.7460	.1240	.0621	1	
	Sig. (2-tailed)	.0043	.0120	.0043		
Time frame	Pearson Correlation	.5210	.3420	.0000	.1660	1
	Sig. (2-tailed)	.0172	.0031	1.000	.0031	

4.8.2 Regression Analysis

Further the researcher conducted a multiple regression analysis so as to determine factors influencing effective and efficient delivery of road construction projectsin Kenya. The researcher applied the statistical package for social sciences (SPSS) to code, enter and compute the measurements of the multiple regressions for the study.

Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (road contractors' performance) that is explained by all the four independent variables (benchmarking, project management, information technology and time frame).

The four independent variables that were studied, explain only 83.4% of the road contractors' performance as shown in table 4.17 represented by the adjusted R^2. This therefore means that other factors not studied in this research contribute 16.6% of the road contractors' performance. Therefore, further research should be conducted to

investigate the other factors (16.6%) that influence road contractors' performance.

Table 4.17 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.913	0.834	0.751	0.4538

4.8.3 Multiple Regression

Multiple regression analysis was conducted as to determine the relationship between road contractors' performance and the four variables. As per the SPSS generated table 4.19, the equation

($\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon}$) becomes:

$Y = 1.308 + 0.558X_1 + 0.785X_2 + 0.620X_3 + 0.731X_4$

The regression equation above has established that taking all factors into account (benchmarking, project management, information technology and time frame) constant at zero, will be 1.308. The findings presented as shown by table 4.18 also shows that taking all other independent variables at zero, a unit increase in benchmarking will lead to a 0.558 increase of road contractors' performance; a unit increase in project management will lead to a 0.731 increase of road contractors' performance; a unit increase in information technology will lead to a 0.785 increase in road contractors' performance and a unit increase in time frame will lead to a 0.620 increase in imp road contractors' performance. This infers that Information Technology contribute most to road contractors' performance followed by project management then time frame while benchmarking contributed the little to road contractors' performance.

Table 4.18 Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.308	1.342		1.623	0.357
Benchmarking	0.558	0.310	0.172	4.342	.0276
Project Management	0.731	0.156	0.210	3.532	.0285
Information Technology	0.785	0.322	0.067	3.542	.0202
Time Frame	0.620	0.245	0.148	3.458	.0249

CHAPTER FIVE
SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary of the findings, the conclusions and recommendations of the study based on the objectives of the study. The chapter also presents the suggestions for further studies.

5.2 Summary of the Findings

On benchmarking the study found that most of organization use benchmark as a strategy of improving organization performance. Likewise, the study found that most of the organization employ benchmarking as a tool for achieving partnering excellence in construction projects and that benchmarking approach is used in our organization in order to determine the organizational strong and weak points, to evaluate its performance, to identification the competitive advantages and disadvantages and to know the improvement priorities for each performance and continued acquiring and applying new knowledge ensure long term benefits of the organization to a great.

To the project management, the survey revealed that project management influence road contractor’s performance and that there exist relationship between the two. Inclusively, the study found that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system and that effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performanceto very great extent.

On information technology, the study found that most of the organization applies IT in their operation as a mean of improving their performances while it also eases the process and procedure of operation. Likewise the study found thatIT usage has leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance, IT performance measurement systems have problems because of large and complex amount of information with absence of approaches to assist decision maker understand, organize and use such information to manage organizational

performance and that their organization consider IT technique such as software management systems, database and communications in its operationto a great extent.

To the influence of time on performance road contractors, the study found that time affects effective and efficient delivery of road construction projectswhile availability of resources as planned through project duration average delay in payment from owner to contractor, planned time for project construction and site preparation time influence effective and efficient delivery of road construction projectsare major factors which influence road contractors performance to a very great.

5.3 Discussions of the Findings

The study sought to establish the influence of benchmarking on effective and efficient delivery of road cosntruction projects in Kenya, to determine the influence of project management on effective and efficient delivery of road cosntruction projects in Kenya, to examine the influence of Information technology on effective and efficient delivery of road cosntruction projects in Kenya and to assess the influence of time of project completion on effective and efficient delivery of road cosntruction projects in Kenya.

On benchmarking, the study established that (81%) of the respondents indicated that they use benchmarking as a strategy of improving organization performance. Further, most of the respondents agreed they employ benchmarking as a tool for achieving partnering excellence in construction projects and that benchmarking approach is used in our organization in order to determine the organizational strong and weak points, to evaluate its performance, to identification the competitive advantages and disadvantages and to know the improvement priorities for each performance and continued acquiring and applying new knowledge ensure long term benefits which are somewhat eluding us at present.

To project management, all respondents (100%) indicated that project management influence road contractor’s performance and that there exist relationship between the two. Meanwhile, the study revealed that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system and that effective communication and fast information transfer between managers and participants help to accelerate the building construction process

and performance. Also, 45% of the respondents opined that project management affect project construction to very great extent.

On information technology, (100%) of the interviewed respondents' indicted that apply IT in their operation as a mean of improving their performances while majority (87%) of the respondents pointed that IT ease the process and procedure of operation. Further, most of the respondents strongly agreed that IT usage has leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance, IT performance measurement systems have problems because of large and complex amount of information with absence of approaches to assist decision maker understand, organize and use such information to manage organizational performance and that their organization consider IT technique such as software management systems, database and communications in its operation. Likewise, (74%) of the respondents' purported that IT influences road contractors performance to a great extent.

Tothe effect of time on Effective and Efficient Delivery of Road Construction Projects, all 100% of the respondents indicated that time affects Effective and Efficient Delivery of Road Construction Projects. Additionally, most of the respondents agreed that availability of resources as planned through project duration average delay in payment from owner to contractor, planned time for project construction and site preparation time influence effective and efficient delivery of road construction projectsto a very great extent.

5.4 Conclusion

The study set out to establish the factors influencing effective and efficient delivery of road construction projects in Kenyawith focus to Nairobi County. From the study findings, the study concludes thatmost of the organization employ benchmarking as a tool for achieving partnering excellence in construction projects and that benchmarking approach is used in our organization in order to determine the organizational strong and weak points, to evaluate its performance, to identification the competitive advantages and disadvantages and to know the improvement priorities for each performance and continued acquiring and applying new knowledge ensure long term benefits of the organization to a great.

On project management, the survey concluded that project management influence road contractor’s performance and that there exist relationship between the two. Inclusively, the study concluded that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system and that effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performanceto very great extent.

To information technology, the study concluded that most of the organization applies IT in their operation as a mean of improving their performances while it also eases the process and procedure of operation. Additionally, the study concluded thatIT usage has leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance, IT performance measurement systems have problems because of large and complex amount of information with absence of approaches to assist decision maker understand, organize and use such information to manage organizational performance and that their organization consider IT technique such as software management systems, database and communications in its operationto a great extent.

On the influence of time on performance road contractors, the study concluded that time affects effective and efficient delivery of road construction projectswhile availability of resources as planned through project duration average delay in payment from owner to contractor, planned time for project construction and site preparation time influence effective and efficient delivery of road construction projectsare major factors which influence road contractors performance to a very great.

5.5 Recommendations

Based on the study findings, the following recommendations are made. On benchmarking, the study recommended that organization to come up with their own way of innovation so that they distinguish themselves from others in terms of services they offers as well as meeting g the expectation of the customers. Also the study recommended that organization to implement modern formulas of working since the ways and means they perform their duties are not flexible to the modern world where there is dramatic change in way of operation.

On project management, the study recommended that many road projects fail in time performance, others fail in cost performance and others fail in other performance indicators, thus, organization should have a clear ways in which they manage their duties so as to ensure timely completion of the work since most of the construction are not completed in time. Likewise, the study recommended that since there are other indicators for problems of road contractor's performance in developing countries such as project management, coordination between participants, monitoring, and feedback and leadership skills. Therefore, it is important to consider how an organization's performance is measured and how it can be communicated to the wider market i.e. how can it be understood and interpreted by the potential investors, employees and customers

On IT application, the study recommended that since Information technology (IT) opens new visions in the businesses and industries performance of the world. The construction industry should consider it as one of the industries using IT technique such as software management systems, database and communications. Further the study recommended that IT usage in the construction industry leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance.

To the effect of time on road construction performance the study recommended that organization should be keen in managing speed in engineering, procurement and construction projects as a key factor in the competition projects. It is also recommended that since customers can consider time as a resource and, in that case, they will encourage the contractor to improve the time performance.

5.6 Suggestions for Further Studies

The study has explored factors influencing effective and efficient delivery of road construction projects in Kenyawith focus to Nairobi County. The constructionsector in Kenya however is comprised of various other contractors which differ in their way of performance and have different settings all together. This warrants the need for other studies which would ensure generalization of the study findings for all the construction industryin Kenya and hence pave way for new policies. The study therefore recommends

other studies be done with an aim to investigate factors influencing performance of contractors in in Kenya in other construction categoriesother than in road construction in order to give a general result that depict real situation in the construction sector.

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APPENDICES

Appendix I: Letter of Transmittal

Name……..

P O Box 70380 00400

Nairobi.

Date

Dear Sir/Madam

RE:FACTORS INFLUENCING EFFECTIVE AND EFFICIENT DELIVERY OF ROAD CONSTRUCTION PROJECTSIN KENYA: ACASE OF NAIROBI COUNTY

I am a Master of Arts student at the University of Nairobi and in my final year of study. As part of the requirement for the award of the degree of Master of Arts in Project Planning and Management, I'm undertaking a research project on **"FACTORS INFLUENCING EFFECTIVE AND EFFICIENT DELIVERY OF ROAD CONSTRUCTION PROJECTS IN KENYA: A CASE OF NAIROBI COUNTY"**. In this regard, I'm kindly requesting for your support in terms of time, and by responding to the attached questionnaire. Your accuracy and candid response will be critical in ensuring objective research.

It will not be necessary to write your name on this questionnaire and for your comfort, all information received will be treated in strict confidence. In addition, the findings of the study will surely be used for academic research purposes and to enhance knowledge in the field of Road Construction.

Thank you for your valuable time on this.

Yours faithfully

Benjamin K. Njenga

University of Nairobi

Appendix II: Questionnaire

FACTORS INFLUENCING EFFECTIVE AND EFFICIENT DELIVERY OF ROAD CONSTRUCTION PROJECTS IN KENYA: A CASE OF NAIROBI COUNTY

Am studying Master of Project Planning and Management program at University of Nairobi and I have designed the following questionnaire about the above topic. Kindly and humbly answer all the questions to the best of your knowledge. Indicate with a tick or filling in the space(s) provided.

Section A: Background information

1. Indicate the position that you hold in the area of working.

   Contractor [ ] Consultant [ ]
   City County staff engineers [ ] Supervisors [ ]

   Any other specify……...

2. How long have you worked in the construction industry?
   1- 5 years [ ] 11 - 15 [ ] 6 - 10years [ ] Above 16 years [ ]

3. What is your highest level of education?

   Post Graduate [ ] Diploma [ ] Undergraduate [ ] Certificate [ ]
   Any other (specify)……

4. Who are the main clients that you serve?

   Private (such as realtors) [ ] Public [ ]

5. Have been involved in road construction?

   Yes [ ] No [ ]

SECTION B: Factors Influencing Effective and Efficient Delivery of Road Construction Projects

PART I: Benchmarking

1. Does your organization use benchmark as a strategy of improving its performance?

   Yes [ ] No [ ]

2. Indicate your level of agreement to the statement below relating to benchmarking and its influence to Effective and Efficient Delivery of Road Construction Projects. Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5- strongly agree.

Statement	**1**	**2**	**3**	**4**	**5**
It provides a framework to check, how a particular construction company compares with the rest of the industry					
Benchmarking aims to identify industry leaders, who demonstrate superior performance by using best construction practices.					
Continued acquiring and applying new knowledge ensure long term benefits which are somewhat eluding us at present					
Our organization use benchmarking since is a good development tool because it enforces a self-critical approach, indicating the points of operation the company must improve					
We employ benchmarking as a tool for achieving partnering excellence in construction projects					
Benchmarking helps our company to define the best possible indicators for comparison and to obtain a picture of the company's entire operation.					

Benchmarking approach is used in our organization in order to determine the organizational strong and weak points, to evaluate its performance, to identification the competitive advantages and disadvantages and to know the improvement priorities for each performance indicator					

3. To what does benchmark affect performance of your organization during project construction?

To a very great extent [ ] To a great extent [ ]

To a moderate extent [ ] To a low extent [ ]

To a very low extent [ ]

4. What would you recommend to be done in order to improve benchmark practices in your as well to improve organization performance?

……

……

……

PART II: Project Management

1. In your own opinion does project management affect your organization performance?

   Yes [ ] No [ ]

2. Is there any relation between project management and your organization performance?

Yes [ ] No [ ]

3. In your level of agreement to the statement below relating to project management and its influence to Effective and Efficient Delivery of Road Construction Projects. Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5- strongly agree

	1	2	3	4	5
One of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system					
The work accomplishment structure, feedback effects on productivity and work quality and effects from upstream phases to downstream phases					
Control system is an important element to identify factors affecting construction project effort					
Human factors play an important role in determining the performance of a project in our organization.					
Construction related performance problems including costs associated with delays, claims, wastages and rework					
Management are controlling the quality of the contract document, quality of response to perceived variations and extent of changes to the contract.					
Effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performance					

4. To what does project management affect performance of your organization during project construction?

To a very great extent [ ] To a great extent [ ]

To a moderate extent [ ] To a low extent [ ]

To a very low extent [ ]

5. What would you recommend to be done in order to improve benchmark practices in your as well to improve organization performance?

……

……

……

……

Part III Information Technology

1) Does your organization apply information technology on its performance?

Yes [ ] No [ ]

2) If yes, does the state of your organization IT ease the process and procedure of operation?

Yes [ ] No [ ]

3) Kindly indicate your level of agreement to the statement aspect of IT and its influence to your organization performance. Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5- strongly agree.

Statement	**1**	**2**	**3**	**4**	**5**
Our organization consider IT technique such as software management systems, database and communications in its operation					
For many years, many processes, functions and operations were done difficulty because of absence of IT field					

IT usage has leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance					
We have accrued many benefits by using IT in the construction projects such as: greater use of IT correlates with better project performance, owners and contractors realize meaningful benefits, IT affects schedule compression beneficially, and overall project cost savings which lead to a success performance of project					
IT improves coordination and collaboration between firms participating in a construction project, leading to better communication practices and so good performance					
Rapid advances of web-based project management and collaboration technology offer new opportunities to improve existing construction project performance					
Information technology management leads to performance improvement in the construction industries					
IT performance measurement systems have problems because of large and complex amount of information with absence of approaches to assist decision maker understand, organize and use such information to manage organizational performance					

3. To extent does IT affect performance of your organization during project construction?

To a very great extent [ ] To a great extent [ ]
To a moderate extent [ ] To a low extent [ ]

To a very low extent [ ]

PART IV: Cost and Time of project completion

1. Does time affect performance of your organization?

   Yes [ ] No [ ]

2. Kindly indicate the extent to which the following aspect of time influences your organization performance during project construction. Where 1- Very low, 2-Important Low important, 3- Medium important, 4- High important, 5- Very high important

	1	**2**	**3**	**4**	**5**
Site preparation time					
Planned time for project construction					
Percentage of orders delivered late					
Time needed to implement variation orders					
Time needed to rectify defects					
Average delay in claim approval					
Average delay in payment from owner to contractor					
Availability of resources as planned through project duration					
Average delay because of closures and materials shortage					

3. To extent does Time of project completion affect performance of your organization during project construction?

   To a very great extent [ ] To a great extent [ ]
   To a moderate extent [ ] To a low extent [ ]

   To a very low extent [ ]

4. In general what would you recommend to be done to improve performance of road construction companies?

……

……

……

……..

THANK YOU FOR YOUR TIME AND PARTICIPATION!!!!!!!!!!!!!!!!!

Appendix III: List of Road Contractors in Nairobi County

	CONTRACTOR'S NAME & ADDRESS
1.	Ashbro Enterprises ltd. P. O. Box 66227NRB
2.	Associated Construction CO. Ltd P. O. Box 31114-00600NRB
3.	Donwoods CO. Ltd P. O. Box 73667-00200 NRB
4.	Gichocho Building Contractor P. O. Box 25385-00100 NRB
5.	H. Young & CO. E.A Ltd P. O. Box 30118 NRB
6.	Imco Holdings Ltd P. O. Box 27718 NRB
7.	Jomwak Enterprises P. O. Box 33599 NRB
8.	Junjo Commercial Agencies P. O. Box 755-00518 NRB
9.	Kaguanzai Builders Ltd P. O. Box 40083-00100 NRB
10	Kange Construction CO. Ltd P. O. Box 6797 NRB
11	Kimemiah Eng. Co. Ltd P. O. Box 51497-00200 NRB
12	Kualam Ltd P. O. Box 12545-00200 NRB
13	Magic General Contractors P. O. Box 28548 NRB
14	Mahan Contractors P. O. Box 711143-00610 NRB
15	Max Victor Enterprises P. O. Box 2668-00200 NRB
16	Njuca Consolidated CO. Ltd P. O. Box 550102 Kenol NRB
17	Nyoro Construction Co. Ltd P. O. Box 74416 NRB
18	Primetech Eng. P. O. Box 55151 NRB
19	Reef Building Systems P. O. Box 40439-00100

20	S. S. Mehta & Sons Ltd P. O. Box 41853-00100 NRB
21	Sinoe Construction Co. Ltd
22	Sivad Construction Ltd P. O. Box 15026-00100 NRB
23	Square M. Contractors P. O. Box 24372 NRB
24	Tractor Den (K) Ltd P. O. Box 70853-00400 NRB
25	Trapoz Contractors P. O. Box 55543-00200 NRB
26	Uday Patel & CO. Ltd P. O. Box 18558-00500 NRB
27	Victory Construction Co. Ltd P. O. Box 45329 NRB
28	Yellow House P. O. Box 4609-00120 Thika