

**FACTORS AFFECTING CONSTRUCTION PROJECTS
COMPLETION IN KENYA: A CASE OF COMMERCIAL
BUILDINGS IN WESTLANDS SUB COUNTY, NAIROBI COUNTY**

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**A Research Project Report Submitted in Partial Fulfilment of the Requirements for
the Award of A Degree of Master of Arts in Project Planning and Management of
the University of Nairobi**

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DECLARATION

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

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This research project report has been submitted for examination with my approval as university supervisor.

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DEDICATION

I dedicate this study to my mum, Mrs. Prisca Ouma, in whom I have always found strength to soldier on. I also dedicate this study to my indefatigable wife, Mrs. Jessicah Atego, without whose persistence, support, and motivation, I would not have this far reached.

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ABBREVIATION AND ACRONYMS

CCN	County Council of Nairobi
JBC	Joint Building Council, Kenya
KCB	Kenya Commercial Bank
NCA	National Construction Authority
NSSF	National Social Security Fund
PMBOK	Project Management Body of Knowledge PMBOK Guide, 5th Ed
PRINCE2	Projects in Controlled Environments
QS	Quantity Surveyor
SPSS	Statistical Package for Social Scientists
USA	United States of America

ABSTRACT

Construction projects successful completion is a large and prevalent problem in the Kenyan construction industry, which can distinctly affect project duration, budget, and also client needs. The purpose of this study was to highlight the factors affecting the completion of construction projects in Kenya and create more knowledge on the causes of project delays. The study delimited itself to commercial buildings in Westlands Sub-County, Nairobi County. This was looked at by taking into account four objectives that included: to determine the extent to which client variations influence the completion of commercial buildings construction in Westlands. To establish the influence of construction disputes on completion of commercial buildings construction in Westlands. To establish the extent to which fluctuation of construction materials price influence the completion of commercial buildings construction in Westlands. To assess the influence of weather conditions on the completion of commercial buildings construction in Westlands. A questionnaire survey was conducted to collect the importance of each factor from construction experts. In total, 248 respondents were targeted to participate in the survey. A pilot study of 15 respondents was first conducted in Upperhill area, before distributing the questionnaire to the targeted respondents. The collected data was analyzed using descriptive statistics including mean, frequency distributions, percentages and standard deviations. The analyzed data was then presented using tables. The study established that client variations affect completion of construction projects. The study also found that to a great extent that client changes have design implications and has time impact. Further the study established that to a great extent that client variations influence the completion of commercial buildings constructions. The study found that majority of the respondents have experienced construction disputes in construction projects in the region. The study further established that to a great extent that construction disputes influence the completion of commercial buildings constructions. The study further established that the method of dispute resolution agreed to, affects project completion. The study concluded that majority of the respondents experienced construction delays caused by weather conditions in construction of commercial buildings. The study also concluded that rain (wet conditions) influenced the completion of commercial buildings constructions. The study also concluded that rainy conditions have caused delays of projects in the region. The study recommended that competent Project managers should be hired, and their skills and references checked ensuring the construction contract does not take longer than intended because of the actions or inactions of any one of the project players. Competent contractors should also be hired, making sure that their past projects are checked to judge their performances in past projects before being commissioned.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The construction industry is one of the main pillars that contribute to the development of a country's economy. The growth in the construction industry influences the country's economic development. As observed in developed countries, construction is considered unique in that it can stimulate the growth of other industrial sectors. Studies show that successful completion of construction projects leads to wealth creation; socio-economic growth and improved standards of living (Memon and et al 2011). Building and construction is also quite central to creating numerous employment opportunities which would help in reducing the unemployment levels which are a problem in many countries, Kenya included. Many of the projects are labour intensive and thus very many of otherwise unemployed people of the working age are employed in this industry.

In Kenya, building and construction industry has been robust (Kenya facts and Figures, Kenya National Bureau of Statistics, 2012). Foreign investors show a lot of keenness to have a stake in Kenya, considered a business hub in east and central Africa and a center from which they can operate with in Africa. As a result of this, Nairobi and its environs has witnessed a boom in construction projects. Most of these commercial projects are being constructed in Westlands region of Nairobi. According to a survey by Mentor Management Limited, a development and project management firm, Upper Hill and Westlands are the prime hubs for commercial property space in Nairobi accounting for over 70 percent of new office supply between 2009 and 2012. Westlands saw the lion's share of new commercial development in the city in 2013, with 29 percent of Nairobi's commercial space delivered.

Improving construction efficiency by means of cost effectiveness and timeliness would certainly contribute to cost saving for the country as a whole. However, the completion of construction projects is faced with different problems, among which is delay. Delay can be defined as an act or event which extends required time to perform or complete work of the contract as additional days of work (Zack, 2003). According to research by Alaghbari and et al (2001), delays are generally regarded as the most common problem, complex,

risky and frequently encountered in a construction project. Due to the high importance of time for both the Owner (in terms of performance) and the Contractor (in terms of money), it is the source of continuous disputes and claims leading to lawsuits.

Within the existing project management procedures, cost management and control is perhaps given more emphasis compared to time management and control. As a result, successful completion of construction projects has become one of the most recurring problems in the construction industry in Kenya. According to Kagiri and Wainaina (2008), more than 40% of all project failures in Kenya arise from delays in project delivery. Mbeche and Mwandali (1996) established that over 70% of construction projects initiated in Kenya are likely to suffer time delays in delivery with a magnitude of over 50% of the contract period. In Nairobi many projects fail to be completed in time causing cost overruns and at times complete abandonment. This can be seen in the various number of building projects which stand unfinished. Even more are those projects that are in the end finished but at an inflated budget and at a date later than agreed in the project schedule.

Project completion menace is not unique to Kenya, almost every country has a fair share of this trouble. Assaf and Al-Hejji (2006) in their work on the Saudi Arabia construction industry observed that only 30% of construction projects were completed on time with an average overrun between 10% and 30%. This leaves a significant proportion of delayed construction projects in Saudi Arabia standing at about 70%. In the USA, eight hundred and forty five of Kick starter top projects missed their targeted delivery dates, Abedi et al., (2011). Jonathan and Arditi (2001), studied 50 most funded projects around the USA and found that out of the studied projects; only 8 out of the 50 met their set deadlines.

There are many factors that contribute to delays in construction projects. Some of these factors include: lack of funds to finance the project to completion, changes in drawings, lack of effective communication among the parties involved, lack of adequate information from consultants, slow decision making and contractor's insolvency, variations among others. Also, project management incompetence, mistake and discrepancies in contract document, equipment availability and failure, mistakes during

construction, bad weather, fluctuation in prices of building materials, inappropriate overall organizational structure.

A lot of research efforts have been made to study delay causes in different countries. For example, In Egypt, a study by Amer (1994) shows poor contract management, unrealistic scheduling, lack of owner's financing/payment for completed work, design modifications during construction, and shortages in materials as the causes of delays. In Nigeria, Mansfield and et al, (1994), found that the financing and payment for completed works, poor contract management, change in site conditions, and shortages of materials were the most important items of delay causes. In his study of Kenyan high-rise projects, Tulakhaba (1999), observed that factors that cause project delays are associated with the project participants, the process and the environment of project implementation. He further argues that the main problem with Kenyan construction industry is related to client erratic payment, architects' instructions, improper planning, clients' instruction, site related factors such as rock, underground water. Poor weather, design changes, slow decision making and executive bureaucracy finish the list.

Delays have costly, risky and undesirable consequences on project success in terms of time, cost, quality and safety. When projects experience delays, timelines are extended and human resources increased to try and beat the deadlines. This then results in poor quality of projects, increased costs incurred, little or no return on investment, inability to meet customer expectations, disputes or total abandonment of the project. Tulakhaba (1999), concluded that the effects of construction delays in Kenya include cost overruns, time overruns and the legal issues arising due to delay. These impacts are not only confined to the construction industry but they influence the overall economy of a country (Okumbe and Verster, 2008).

Major construction projects are financed by international investors and bank loans. These financing is increasingly being tied to efficiency in the Kenyan construction industry and the need for more transparency and accountability in the way things are done. Financial institutions and foreign investment is not supported by the inefficient construction

industry. This is because foreign investors are attracted by efficient infrastructures that support profitability of their investments. According to Tulakhaba (1999), project delays are manifestations of inefficiency in the construction industry and this makes it difficult to finance projects.

In summary, one can conclude that successful execution of projects and keeping them on time is imperative to avoid consequences resulting from delays. Therefore, mitigation measures that will minimize or avoid the adverse consequences of delays in construction projects are required (Abedi et al., 2011). According to Tulakhaba (1999), to minimise delays more efforts should be directed at the key participants in project implementation, the process and infrastructure, and the environment. The seven main causes of project delays namely financing, estimates, variations, price changes, redesign, client interference and change of mind fall in these three major areas of project implementation.

With the demand of commercial projects development in Westlands, and the role they play in sustaining the macro-economic growth, it is essential to ensure a more improved and more suitable execution so that construction projects can be completed on time, within budget and with high quality. Therefore, it is important to research and explore the factors that affect completion of construction projects during construction/execution phase of commercial projects in Westlands, Nairobi.

1.2 Statement of the Problem

Project completion is one of the biggest problems often experienced in construction projects in Kenya. Research shows that this is not a problem unique to Kenya, but a global phenomenon. In Kenya, most construction projects are rarely completed within the scheduled time. Mbeche et al., (1996) found out that over 70% of construction projects initiated in Kenya are likely to suffer time delays. For instance, The National Social Security Fund (NSSF) complex took five years to complete as opposed to the original estimate of two years. The other example is The KCB Plaza building in the upmarket Upperhill area, funded by KCB bank. Ground breaking was in December 2010, construction started in 2011 and it was expected to be completed in early 2013, but delays have seen it delivered 17 months behind schedule.

In Westlands Sub-County, not far from the Museum Hill overpass, is Villa Rosa Kempinski. A private commercial development by Simba Corp Group. Design was commissioned in 2006, the Construction began in 2009 and was completed in September 2013, instead of early 2013 as had been projected. In the same area, and right next to Villa Rosa Kempinski is AVIC International Office Headquarters, in Africa. Construction is estimated to take 5 years, starting in 2015 (Source: Business Daily, Feb 2018). However, AVIC has been locked in legal battles with Kempinski, with Kempinski having a court order to stop the construction.

A typical example of stakeholder conflicts causing delays in construction. As at January 2018, AVIC office headquarters was behind schedule by 1 year due to these legal battles. AVIC International claims it has lost Sh1.8 billion in construction delays arising from the vicious battle. (Source: Business Daily, Feb 2018)

Failure to achieve targeted time, for example, results in various unexpected negative effects on the projects. The common results are late completion of project; cost escalations; disruption of work; loss of productivity; third party claims; disputes; and abandonment or termination of contracts (Aziz, 2013). Normally, when the projects are delayed, they are either extended or accelerated and therefore, incur additional cost. (Ssemwogerere, 2011). This study seeks to contribute to attempts by others in identifying further the factors that affect the completion of construction projects in Kenya by studying commercial buildings in Westlands, Nairobi County.

1.3 Purpose of the study

The purpose of the study was to investigate the factors that influence construction projects completion in Kenya using a case of commercial buildings in Westlands, Nairobi County.

1.4 Objectives of the Study

The specific objectives of the study were:

1. To determine the extent to which client variations influence the completion of commercial buildings construction in Westlands.

2. To establish the influence of construction disputes on the completion of commercial buildings construction in Westlands.
3. To establish the extent to which fluctuation of construction materials price influence the completion of commercial buildings construction in Westlands.
4. To assess the influence of weather conditions on the completion of commercial buildings constructions in Westlands.

1.5 Research Questions

The study sought to answer the following research questions:

1. To what extent does client variations influence the completion of commercial buildings construction in Westlands?
2. How do construction disputes influence the completion of commercial buildings construction in Westlands?
3. To what extent does fluctuations in construction materials price influence the completion of commercial buildings construction in Westlands?
4. What is the influence of weather conditions on the completion of commercial buildings construction in Westlands?

1.6 Study Hypothesis

The study was guided by the following alternative hypothesis:

1. H₁: Client variations has a significant influence on the completion of commercial buildings construction in Westlands.
2. H₂: Construction disputes has a significant influence on the completion of commercial buildings construction in Westlands.
3. H₃: Fluctuation of construction materials prices has significant influence on the completion of commercial buildings construction in Westlands.
4. H₄: Weather conditions has a significant influence on the completion of commercial buildings constructions in Westlands.

1.7 Significance of the Study

This study may provide useful information to the different stakeholders within the construction industry. The owners of the buildings may find this study useful when making decisions on investing on commercial buildings. With the findings on owner related causes of the delays, more attention can therefore go into the planning for construction of commercial buildings by the owners.

The outcomes can also be used by not only local, but also international industry practitioners, and investors who may be interested in venturing into commercial buildings, but possess no prior practical knowledge of the construction industry in Kenya. The outcomes can further help all practitioners to develop wider and deeper perspective of factors causing delay in commercial projects and provide guidance to projects and construction managers

This study may prove to be important to the government of Kenya in formulation of construction industry policies and the way these policies are implemented. An informed policy provides useful guidelines to the industry which minimizes project failures, reduces risks and severally enables order in the construction industry.

The weatherman may also find the findings of the study useful to forecast the weather of Kenya. Proper weather forecast and dissemination of the information therefore is crucial in decision making and planning for construction projects if delays are to be minimised and planned for.

The findings of this study may also be relevant to future researchers and scholars in that it intends to recommend further research questions that can become useful study basis for future researchers, and it will further act as a source of empirical literature since it shall provide insight on the factors influencing project delays of commercial buildings, hence enable them attain informed information on the same.

1.8 Limitations of the Study

This researcher foresees various limitations that may hinder the achievement of the study objectives. For instance, due to logistic problems or apathy of participants, some of the stakeholders with the necessary information about projects delay may not return their questionnaires, or misplaced the questionnaires, hence necessitating extra expenses and time in reproducing more. This problem will be mitigated by producing extra questionnaires for such kind of instances. Further, the time for collecting the data may not be sufficient to reach all the respondents, and there is also the possibility that some respondents may not have ample time to fill in the questionnaires in the assigned time. The use of email to send out some of the questionnaires is intended to address the issue of time spent on distributing the questionnaires.

The participants are considered in their capacities of firms and not as individuals. For instance, where a contractor or an architect, engineer or quantity surveyor is mentioned as a member in a building team, it is considered to represent a firm. The firms have policies barring dissemination of information to outsiders thus some vital information is likely to be withheld. This problem can be addressed by having a letter from the University introducing the researcher. An attempt is also made by the researcher to have a letter addressed to the respondent confirming that no names will be disclosed and that the information are for the sole purpose of academic research.

1.9 Delimitation of the Study

This study concentrated on the factors that influence delayed delivery of construction of commercial buildings in Kenya through a study of commercial buildings in Westlands, Nairobi. Specifically, the study focused on players in the construction industry e.g. the developers, the design team, project managers and contractors.

The study was delimited only to the construction phase of the commercial buildings and the delays that occur during the design process are not part of the study. The study mostly targeted construction projects that are underway and into the second half of the construction phase. The researcher used National Construction Authority (NCA) records

to check the commercial buildings that have actually gone to site for construction, i.e. registered with NCA between 1-2 years before the date of the study, taking the date of the study to be February 2018, i.e. January 2016 – January 2017. At this targeted stage of the project, delays may have started to occur and not just a prediction of possible delays.

1.10 Assumptions of the Study

The study assumed that the initial time allocated to the project is adequate for the completion of the project, and therefore the delays observed by the projects were not as a result of initial contract time underestimation. Since the research focuses on the construction phase of the process, another assumption is that the rate of work of construction workers within Westlands, Nairobi is the same. The study also assumed that the researcher received all necessary cooperation from all respondent and the respondents will be truthful and willing to provide accurate and valid information freely.

1.11 Definition of Significant Terms as Used in the Study

For the purposes of this study the following terms are used in the following context:

Claim: A request for a remedy to a given situation arising from a dispute e.g. breach of performance, a request for the correction of a construction defect(s), for which a party feels they have been aggrieved and the opinion is not shared by the other party.

Commercial Building: A building that is constructed for the purpose of letting/renting or conducting commercial activities. Can also mean that more than half of the activities in the building are income generating to the owner and or to the tenant.

Construction delay: Means that a construction project has overrun its initial scheduled construction time, and may impact the final delivery date on the contract.

Construction Disputes: These are disagreements that arise between the parties on a contract, due to a perceived or real violation of a construction contract, lack of understanding of the conditions of the contract, delays on a contract, failure to administer the contract, and unsubstantiated claims being made by one of the parties involved.

Delay: This refers to an event which affects the start, or completion of a planned activity by pushing it away from the intended start or finish date to a later time.

Disputes: A disagreement between the client and the contractor regarding the contract or construction that cannot be resolved amongst the two and that require an intervention/resolution by a third party as agreed in the contract.

Owner: Refers to the individual or firm that is investing in the construction of the commercial buildings.

Price Fluctuations: The unpredictable and unforeseen rise of construction materials prices within the construction period usually as a result of factors such as Government Policy, civil unrest or inflation.

Projects Completion: Successfully delivering a project within the original time frame.

Successful Completion: Refers to the construction of the project coming to an end or being delivered within the allocated time.

Variation: This refers to a change or changes to the scope of the project after it has been baselined. Variation could be a change in specification, an off specification or an additional work that was not initially in the plan.

1.12 Organization of the Study

Chapter One covers the background to the research, statement of the problem, Purpose of the study, objectives of the study, research questions, significance of the study, scope, limitations and delimitations of the study, Assumptions of the study and definition of terms. Chapter Two is on literature review where past studies relevant to the study objectives are discussed. Chapter Three presents research methodology used in this study, which details the methods that will be adopted to ensure that valid and reliable data is collected. Chapter four presents data analysis, presentation and interpretation whereas chapter five covers summary conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature relevant to the study. It presents an overview of previous work on related topics that provide the necessary background for the purpose of this research. It will cover the factors affecting the completion of construction projects, conceptual and theoretical frameworks, and the knowledge gap.

2.2 The Concept of Successful Completion of Construction Projects.

Successful completion of projects can be defined as the delivery of a project within the planned time, budget and scope. When time constraint is not met, projects end up suffering delays. Delays refers to a project slipping over its planned schedule and is considered as a common problem in construction projects.

In Kenya, most construction projects are rarely completed within the scheduled time. Mbeche et al., (1996) found out that over 70% of construction projects initiated in Kenya are likely to suffer time delays. Construction delays is not just unique to Kenya. Pourrostam et al (2001), remark that, project delays are the biggest challenges for the construction industry in developing countries. Delays are, however, not only experienced in the developing countries, they are a global phenomena (Enhassi, 2009).

Several efforts by project professionals and researchers to tackle the causes and effects of project delays have not produced sufficient positive results (Sambasivan and Soon, 2007). “Even with today’s technology, and management’s understanding of project management techniques, construction projects continue to suffer delay and project completion dates still get pushed back” (Aibinu and Odeyinka, 2006). Kaliba et al (2009) identified delay payments, inappropriate financial process and difficulties, contract modification and economic problems as causes of delays. In Vietnam, the causes of delays are identified as financial difficulties on the part of the owner, a lack of supervisor responsibility, design change by the owner, incompetence on the part of the contractor, and inadequate contractor experience (Kim et al, 2016).

If delays in construction projects are not managed properly, they will give rise to dissatisfaction to all parties involved and a negative working environment, and even lasting broken relationships. Other common results of delays are late completion of project; cost escalations; disruption of work; loss of productivity; third party claims; disputes; and abandonment or termination of contracts.

2.2.1 The Triple Project Constraints

It is mostly accepted that the three project constraints of time, scope and cost are the indicators for measuring the success of the delivery of projects. However, some authorities e.g. PRINCE2 add quality, risk, and benefits. The Triple Constraint states that the success of the project is impacted by its cost, time and scope. Westland (2018), Says that project managers can trade between these three constraints; however, changing one means that the other two will suffer to some extent. For instance, if the time or schedule has to be made shorter, it means that both the cost and scope of the project will change. More resources will be required to reduce the time, therefore the cost will go up, and the scope will have to be reduced.

In order to determine if project success has been achieved, good methods of measurement are required. If the wrong things are measured, then the focus and attention will be diverted away from the achieving the success (Baratta, 2006). The classical Triple Constraint, as a tool for measuring project success, thus focuses on measuring if the project has been delivered on time, within budget, and the quality expected.

2.3 Client Variations and Completion of Construction Projects

Variations are changes in specifications and scope of the project which were not considered originally or changes of design to address some omissions that were vital to project functionality. Alterations may require temporary stoppages that delay overall project completion. One of the major problems faced by the construction project is the issue of the variation order occurring during the construction phase which results in

delaying projects and overruns the cost. These changes may be done by the project team for reasons such as unworkable designs, change in ideas, taste or market conditions.

However carefully a construction project is planned and scheduled, it is almost certain that there will be variations at some point in the project life cycle. Ming et al. (2004) noted that project variations can be classified as “anticipated variation” and “emergent variation”. Anticipated variations are planned in advance and occur as intended. On the other hand, emergent variations arise spontaneously and are not originally anticipated or intended. Another way to view project variation is through its necessity. In this way, project variation can be classified as “elective variation” and “required variation” (Ming *et al.*, 2004). An elective variation is where one may choose whether or not to implement; and a required variation is where there is no option but to make the variation. Arain et al (2005) distinguished two types of variations, namely: beneficial and detrimental variation.

A beneficial variation is one that improves the quality standard, reduce cost, schedule, or degree of difficulty in a project (Arain et al, 2005). This type of variation, in construction dialect is also referred to as value engineering. It eliminates unnecessary costs from a project as a result; it optimizes the client's benefits against the resource input by eliminating unnecessary costs. According to Arain et al (2005), a detrimental variation is one that negatively impacts the client's value or project performance. For example a client may require the substitution of quality and expensive materials to substandard cheap materials. Arguably, a detrimental variation order compromises the client's value system. For example, in commercial buildings, powder coated aluminium window frames result in discolouration if selected instead of anodized aluminum frames.

In construction, many professionals agree that variations impact portions of the project directly or indirectly and result in reduced productivity (Aziz, 2013). This is always a subjective issue as the contractor feel that the loss due to variation order is the fault of the designers and owners. Conversely, owners typically claim that the loss in productivity is due to poor management on the part of the contractors (Aziz, 2013).

Generally, client's and architect's instructions are the most common causes of design changes. A study of Highrise buildings in Kenya by Tulakhaba (1999), shows that client variations occur in 69% of the projects, and most prominent in private sector projects. Mhando, (2017) affirms that client related causes of variations, rank first as the most predominant cause of variations. Finding by studies conducted by Pourrostam et al (2001) and Sunday (2010) re-affirm that change of plans or scope by clients is a factor that contributes mostly to the causes of variations in the construction in Iran and Seychelles respectively. This is further corroborated by Arain et al (2005) that shows in his study that the highest number of variations and omissions that occur in construction projects is contributed by the clients.

Change in specifications, change of plans or scope and noncompliance design with government regulations are the main causes of variations in construction projects in Singapore (Arain et al, 2005). In Seychelles, Sunday (2010) identifies impediment in prompt decision making process, replacement of materials and procedures by the clients as the major causes of client variations in the construction industry. In general, client variations usually come in the form of change in specifications by the owner, change of plan or scope of the project, obstinate nature of the owner, impediment to prompt decision-making process and even owner's financial problems (Memon et al, 2014).

The problem of client variations in construction industry is a universal occurrence, and its effects leads to friction among clients, consultants and contractors due to project time and cost overruns creating a substantial financial risk to clients (Kimathi, 2016). Client variations often result in increase in the Project Cost, Delay in completion and Logistic Delays are substantial effects of variations in construction projects (Kimathi, 2016). For instance, client variations will affect the project schedule which will force major resources reallocation by the contractor. Such changes in schedule means the contractor will have to provide more resources if the same timelines are to be met, or an eventual time overrun. A study by Smith (2016) shows that additional work and specification changes by clients had greater schedule overruns 50.1% than those without additional work at 32.8%

Client variations may also require the design team to re-design to meet the particular change requested by the client. Due to this, the designer wouldn't be able to develop a comprehensive design thus lead to numerous design variations at construction phase, and a possible delay in the design stage. A delay may hinder subsequent construction activities thus delaying the project progress. (Kimathi, 2016).

2.4 Construction Disputes and Completion of Construction Projects

Disputes are a common feature of the construction industry. However, there seems to be confusion among construction professionals about the differences between conflict and dispute, and these terms have been used interchangeably especially in the construction industry. However, according to Fenn et al. (1997) conflict and dispute are two distinct notations. Conflict exists wherever there is incompatibility of interest. Conflict can be managed, possibly to the extent of preventing a dispute resulting from the conflict. On the other hand, disputes are one of the main factors which prevent the successfully completion of the construction project. Disputes are associated with distinct justiciable issues and require resolution such as mediation, negotiation arbitration, etc. If conflicts are not well managed, they quickly turn into disputes. A dispute does not become a dispute until a claim has been presented and denied — a claim being a request for compensation for suffering any kind of loss caused by any party of the contract.

Construction disputes stem from a variety of problems that can be faced during the construction process. Construction disputes can arise during the formation, meaning, breach or termination of contract (Fenn, et al, 1997). Construction disputes also can arise out of financing and construction contracts and the associated duties imposed on the contracting parties. Some of the most common types of construction disputes are cost overruns, delay claims, defective work disputes, dispute with workers, and collection claims.

McManamy (1994), states that the structure of the construction business makes the industry and the process vulnerable to construction disputes. Having no disputes in a project would be considered the ideal situation, but in most cases, according to the theory, it is not the reality. Studies are increasingly showing that construction stakeholders are taking dispute matters more and more seriously. It seems that the industry is recognizing disputes and dispute resolution as key factors for higher returns, better quality, and successful project outcomes (Tolson, 2013). Construction contracts are being drawn with dispute clauses, stating damages, how to handle and settle disputes, e.g. by ways of an arbitrator, alternative disputes resolutions, and their rulings to be binding to both parties involved in the disputes.

In Kenya, for example, it is a common practice to negotiate a building contract based on The Agreement and Conditions of Contract for Building Works by The Joint Building Council (JBC 1999), which sets the conditions of contracts for building and works. Clause 45 in JBC addresses settlement of disputes in the construction process. According to Clause 45, both parties in a construction contract are required to make an attempt to reach an agreement before taking any legal action. Based on that fact, it is very likely that many, if not most, disputes are settled according to some of the specific ways listed in this clause, usually by an arbitrator. The chapter also states that the ruling of the arbitration is binding to both parties (JBC 1999).

In order to prevent or manage disputes, it is first important to understand the causes. Different researchers have come up with different causes of disputes in construction projects. A study by Kumaraswamy et al (1997) listed the common sources of construction disputes as variations, extension of time, payment, quality of technical specification, availability of information, administration and management, unrealistic client expectations and determination. Hohns (1979) believes that construction disputes vary from one project to another. He identifies existence of errors, defect or omissions in the contract documents, failure of someone to count the cost of undertaking at the beginning, changed condition, consumer reaction and people involved.

Tulakhaba (1999) included industrial disputes in his study of construction project delays. He defines it as those disputes arising between the contractor and workers that may lead to strikes or disputes hence impair work progress. Usually, it arises when contractors decide to ignore their obligations as required by the various regulations. Such obligations include insure workers against injuries, reasonable wages, reasonable working hours and provision of protective gear.

Many of the identified causes of disputes can be foreseen and predicted to some degree, such as weather, change of scope, payment, workmanship, quality, and documentation. Kumaraswamy (1997) tried to distinguish the causes of disputes into root causes and proximate causes. He defined proximate causes as those that were visible and obvious, and then separated these from the root causes. An example of a proximate cause is a change by client and, in that scenario, the root cause would be a lack of information for the client to make appropriate decisions.

According to Deming (1986), controllable causes for claims can be removed with the use of process management that eliminates the conditions that initiate their occurrence. Once all controllable causes have been eliminated, there will be some degree of process stability, i.e., minimal claims and disputes. It is not probable that all potential dispute factors will be controlled at the same time in a project due to multiple variables, but it is possible to control a substantial amount of them.

Disputes in the construction industry are often lengthy, complex and expensive to resolve. Their effects are that project may suffer cost and time overrun, the owner may suffer significant loss and profit and worst still the project may be delayed, abandoned or failed. When a dispute arises, the construction work progress will be slow due to the conflict and disputes between the contractor and client (Chambers 2006).

Disputes cause a back and forth between the parties in an effort to resolve the issue. For instance, one party (claimant) notifies the other party (respondent) of a claim. A dispute does not arise unless and until it emerges that the claim is not admitted. For example, there may be an express rejection of the claim (Chambers 2006). There may be

discussions between the parties from which objectively it is not to be inferred that the claim is not admitted. The respondent may simply remain silent for a period of time. During this time, the progress of work will either be slow, or even completely stalled until the dispute is resolved, leading to a delay in the originally scheduled time.

2.5 Construction Materials Price Fluctuations and Completion of Construction Projects

Most countries desire to maintain a stable price level of goods and services. This however, appears to be an uphill task given the incidence of inflation presently ravaging developing economies of the world. Inflationary increase in the price of construction materials has been one of the major issues to development and a contributing factor to frequent cost overruns and subsequently project abandonment and delays (Oghenekevwe et al 2014).

Building materials, such as sand, aggregate, cement, timber, steel, roofing materials such as tiles, plumbing and sanitation fixtures, and electrical fittings, have been playing an important role in the construction industry and therefore fluctuating costs of building materials poses a significant threat to the construction industry. The construction industry is vulnerable to inflation in prices of materials. According to Obiegbu (2003), materials needed for erecting and completing construction works amount to about 35-45 percent of the total project cost while in some other projects, the materials cost may be as high as 60 percent. Materials resources are thus critical to any construction project. Idoro et al (2010) found that building materials alone account for 50% to 60% of project cost and control about 80% of its schedule. This therefore means that increase in the cost of materials will affect the total cost of construction and if not properly managed, may affect the delivery of the project.

To illustrate this, if a bag of cement, which is valued at Kshs 580.00 in July 2016 at the inception of a commercial project, goes as high as Kshs 650.00 in July 2017 at the middle of the construction stage, depicting about 12% increment, this means that the contractor will spend 12% more on just cement alone. If this was not factored in during pricing, then it can lead to potential financial difficulties for the contractor, and thereby resulting into

possible delays. Supporting this view, Idoro et al (2010) established that increase in the prices of building materials has multiplier effects on the industry, affirming that many projects are not completed on time due to the cost of materials, which have been on the increase.

Inflation in construction material prices affects the construction contracts especially the fixed price contracts. This implies that the client will not entertain any increase in the contract sum as a result of fluctuations in the prices of materials and labour (Idoro et al 2010). In order to prevent a situation in which high fluctuations erodes the contractor's margins, the contractor factors inflation risk into his pre-tender estimating processes. Experienced contractors have an understanding of the relationship between prices of construction materials over the preceding years and inflation rate, which is fundamental for pricing inflation risk at pre-contract stage. In cost reimbursement contracts, increases or decreases in material prices require that payment become due to the contractors from the employer and vice versa (PMBOK 2013). In Kenya however, it is always a one-way direction of employer to contractor as a result of inflation.

Provisions of the standard forms of contracts in Kenya, commonly referred to as The JBC (1999) gives guidelines on methods of valuations or adjustment in calculation due to fluctuating material prices. For instance, clause 35.5, of JBC 1999, form of contract, include provision for adjustment for fluctuations due to exchange rate, but because of the integral problems encountered in valuation or calculation for any changes, these become mostly green area for dispute in contract administrations. Clause 35.6, of JBC 1999 says that no adjustment shall be made in respect of changes in basic prices which occur after the date for practical completion except during such other period as may be granted as an extension of time (The JBC 1999).

The economic environment in which all sectors of a country operate including the building materials sector are set by the Government of that country. Mansfield, et al (1994) affirms this when they identified government fiscal policies as one of the factors affecting the cost of building materials in the construction industry. Generally, factors such as the change in government policies and legislations, scarcity of building raw

materials, fluctuation in the cost of fuel and power supply, inadequate infrastructural facilities, corruption, fluctuation in the cost of plant and labor, seasonal changes, fluctuation in the cost of transportation and distribution, political interference, local taxes and charges, fluctuation on cost of raw materials, fluctuation in the interest rates and the cost of finance, the inflation, and fluctuation in the exchange rate were many of the recipes for the fluctuations in the cost of building materials (Idoro, et al 2010).

In spite of the past studies on the fluctuations in the cost of building materials, little is publicized about the implications of the rise in cost on delivery of construction projects. Most literature has concentrated on identifying the causes with little emphasis on the implications. Wahab (1985) established that fluctuations trend of materials has lead to higher construction costs. These cost overruns give rise to claims, construction cost estimate losing usefulness within short periods, difficulty in forecasting and planning, and frequent contract price variations, all of which often leads to project delays, and abandonment.

2.6 Weather Conditions and Completion of Construction Projects.

Weather is a natural phenomenon and is a reaction to changes in atmospheric pressure. These changes alter air movement, temperature, and humidity. Weather conditions can have far reaching effects on construction projects such as duration and cost of construction activities. One of the main factors causing delay on construction projects is weather conditions (Baldwin et al. 1971). This is because construction projects, in general, are executed in an outdoor environment.

Benjamin et al. (1973) suggested that almost 50% of construction activities are sensitive to weather conditions. For instance, delivery of materials to site will most definitely be affected by wet conditions. Rains can turn a construction site into a gigantic mud hole that would hinder access to the site by all building trades and will prevent or slow general earthwork (grading, trenching, and backfilling activities), paving, and foundation work. Both foot and vehicle traffic can also be restricted. The use of cranes in lifting construction materials can be stopped in cases of heavy winds and thereby affecting activities that are being undertaken on higher floors of construction project.

Weather elements that affect construction work are rain, hot and cold temperatures, and to some extent, wind. These weather elements can sometimes be very extreme in some parts of Kenya. Rain interrupts construction in areas prone to high levels of downpour (Tulakhaba 1999). In Kenya, the long rains season starts in April and ends in August. The short rains season occurs between October and November. Nairobi Province is located within the Kenya highlands which is one of the high rainfall areas of Kenya receiving up to 2,000 millimetres of annual rainfall (Statistical Abstract, 1995). Hot weather in Nairobi is experienced between October and April while the cold season on the other hand, is experienced between May and September.

Many only see weather disruptions as the direct time lost during the bad weather. Unfortunately, some events can cause damage to partly completed structures which could take days or weeks to repair. Recovering from one hour of rain could take days while we pump work areas dry, clean debris and wait for materials to dry out. Adequate insurance can cover us for some of the damages but they usually don't cover for the delays caused to the project (Tulakhaba 1999).

Rain may cause stoppage of construction works such as in situ concreting and soil compaction especially if work places are exposed. Thus, if it starts raining, concreting and soil compaction must stop and be protected (Tulakhaba 1999). A high water table or excessive rain can increase groundwater. This will require dewatering provisions for excavation and trenching must to keep the site and excavations dry enough to allow steady progress, if not provided, these activities will have to be stopped, or postponed. Strong winds, on the other hand, can prevent lifting materials with cranes and can even cause accidents by overbalancing cranes. Tulakhaba (1999) further says that wind may topple unfinished walls, blow away materials that are not securely fastened, and makes it difficult to construct works such as sidings and precast units. Lost or destroyed items must be replaced resulting in increased costs, reworks and delays.

The effect of weather conditions on construction activities is generally in the form of reduced labour productivity or work stoppage. Reduced labour productivity is generally attributed to reduced human performance due to heat or cold stresses resulting from the combined effect of temperature, humidity, and wind velocity. Weather-related work stoppage is attributed either to the inability of construction personnel to work under severe weather conditions of heavy rain, snow, or gusting winds or simply to compliance with safety regulations in such adverse weather conditions (Sanders et al 1991).

A number of studies have been conducted to establish how labour productivity is affected by weather conditions for general construction. Tulakhaba (1999) in his study found out that in a number of projects too much rain prevented work from continuing. In one project, he noted, basement work delayed because of rain. The basement had to be covered by polythene sheets as an afterthought to prevent accumulation of water. The occurrence of rain may not be easily controlled but it can be managed. The real cause of the problem of rain is management. The contractors planning practices should be sensitive to weather conditions, making provisions for the rainy seasons in contractor's project planning.

Cantwell (1987) considered the impact of weather on work stoppage and established daily rainfall thresholds that would cause the stoppage and interruption of construction activities. Benjamin et al. (1973) proposed a simulation model that factors the interruptive effect of weather in scheduling. The model simulates construction duration by making daily work/no-work decisions according to the historical hourly weather data. Moselhi et al. (1990) proposed a hybrid system for construction planning and scheduling that considers the impact of reduced labour productivity due to weather. These models attempt to quantify the impact of weather conditions on project delivery. Quantifying this impact is valuable to stakeholders for preparing realistic schedules, cost estimates, and reliable bids. In general, weather can't be controlled, but building professionals can prepare for it and adjust to resulting conditions. Proper preparation, adjustment, and reaction to local weather will influence the success of a construction project and the completed building (Moselhi et al. 1990).

2.7 Theoretical Review

A theory is a set of assumptions, propositions, or accepted facts that attempts to provide a plausible or rational explanation of cause-and-effect (causal) relationships among a group of observed phenomenon. A theoretical framework on the other hand is a group of related ideas that provides guidance to a research project or business endeavor. In this section, the focus is on various theories under which the study is underpinned. It specifically focusses on game theory, and Principal-Agent Theory.

2.7.1 The Game Theory

Game Theory was firstly explored by a French mathematician named Borel in 1921 and improved by John Von Neuman, who published his first paper on game theory in 1928. Borel imagined using game theory in economic and military applications and his goal was to determine, whether a best strategy for a given game exists and find that strategy. Game theory is a method originated from the mathematical sciences in which it is used in competitive or cooperative position to find optimal choices that will lead to desired outcome (Brian 1978).

Game theory approach can be used as an efficient framework in decision making about conflicts and disputes in construction projects. It seeks to get to the essence of decision-making and the associated strategies in situations where two or more parties are interdependent, and where the outcome of their conflict and competition must be the product of their joint requirements and the interaction of their separate choices (Bacharasch et al. 1981).

Disputes can sometimes arise from conflicts between clients and main contractors due to the non-cooperative behaviors between them. These conflicts may be driven from different issues such as project delays or suspension, differing site conditions, contract changes and etc. If these conflicts are not peacefully resolved, they can lead to non-compensable disputes, such as project suspension that can cause considerable loss for both parties involved in the project. In this situation the best decision should be considered for resolving the conflicts (Bacharasch et al. 1981).

One of the most efficient tools to investigate these disputes is game theory. Game theory may provide, by its very nature, the appropriate tools for the analysis and eventual solution of conflicts of any kind in the construction industry. Game theory, has the potential to address some of the problems facing the construction industry within a collaborative framework. In construction projects, conflicts among builders and owners are very common, particularly in a bidding or claiming situation, and game theory is a natural tool that can be used to analyze the situation systematically. Game theory focus on strategic interaction and conflict providing a way to think about the conflicting structure of collective decision making processes (Brian 1978).

In a broad sense, game theory can be classified into two categories: non-cooperative game approaches, where a decision-making unit treats the others as competitors, and cooperative approaches where a group of decision-makers decide to undertake a project together in order to achieve their joint business objectives. In game theory, individuals or groups become players when their respective decisions, coupled with the decisions made by other players, produce an outcome (Bacharasch et al. 1981). The options available to players to bring about particular outcomes are called strategies. Strategies are linked to outcomes by a mathematical function that specifies the consequences of the various combinations of strategy choices by all of the players in a game. A coalition refers to the formation of sub-sets of players' options under coordinated strategies (Bacharasch et al. 1981).

2.7.2 The Principal-Agent Theory

There is a growing literature concerning the application of the principal-agent theory to construction management. The theory focuses on information asymmetry, in which one of the two parties is better informed than the other, and in which they do not share the same interests. Opportunistic behaviour can be expected in such relationships (Ceric, 2003). The concept of asymmetric information is of great value to modern economic theory, and it is thus likely to play a major role in construction projects. In a standard situation, the project owner hires a contractor to perform all the activities required to

complete the project. According to the principal-agent theory, the relationship between the two parties involves self-interest of each party, which is also shown in Figure 1

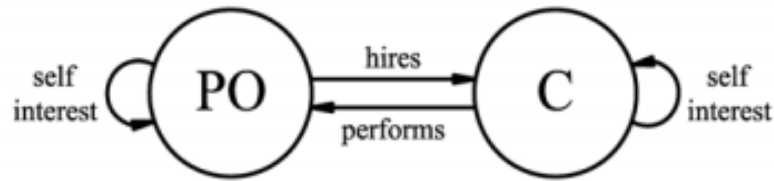


Figure 1 Project Owner - Contractor relationship (PO: Project Owner C: Contractor)

(Source: Ceric, 2003)

It is commonly assumed that all participants in the project will work together in order to achieve the same goal. However, there is a potential conflict of interests between the participants because they all have their own self interests. Based on the principal-agent theory, relationships between the project owner and contractor, it means that the project owner does not have all the information about the contractor before the contractor is hired. Similarly, the project owner does not have all the information about the project manager before hiring. The same holds for the contractor and the project manager working on the contractor's behalf.

Hidden information or hidden action causes the moral hazard risk in the project, which can cause hold-up problems. For instance, the project owner can invest some money at any stage of the project and trust that the contractor will cooperate, but it can happen that the contractor will actually behave opportunistically. An example is if a contractor know that he may possibly delay work due to materials supply difficulties, and yet not disclose this information to the client. The same holds in the opposite direction. The contractor can also invest some money at any stage of the project and trust that the project owner will cooperate, but it can happen that the project owner will act opportunistically. For example, where there are variations, and before they are approved, a contractor may carry out the works and implement, only for a dispute to arise later once he has already invested the money and actualized the variations.

2.8 Conceptual Framework

The conceptual framework helped to illustrate the causal relationships between the independent variables and the dependent variable. Figure 2 shows the relationship between the independent variables which are client variations, construction disputes, construction materials price fluctuations, and weather conditions. The relationship they have on the dependent variable which is construction project delays. Other variables are the moderating variables. These are factors that have a direct impact on the performance of the projects or have it coming indirectly but the final results felt in the rate at which these projects are implemented. Due to time and limitation of the size of the document, these factors have not been included in the literature but they have an impact on the time of projects completion.

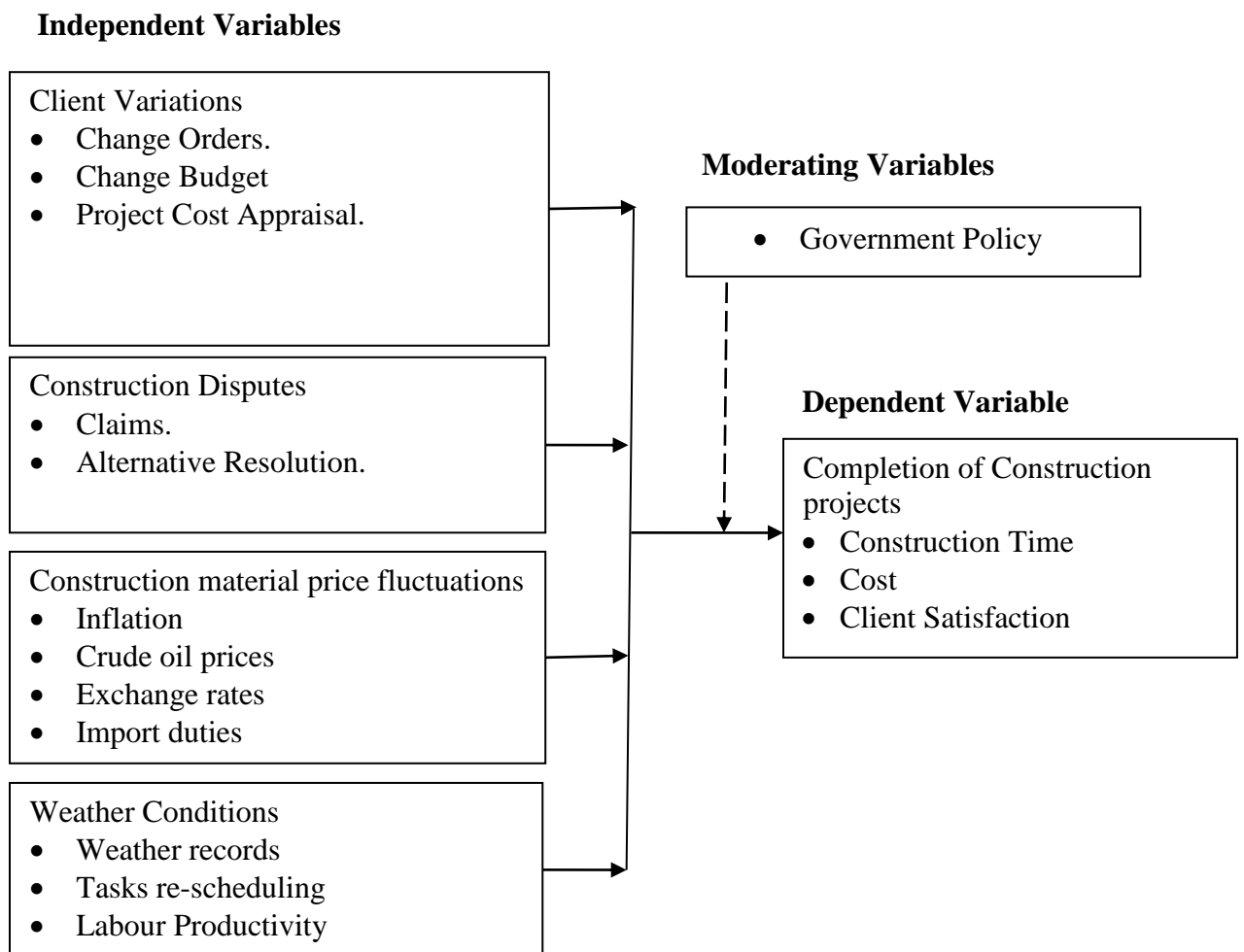


Figure 2 Conceptual Framework

2.9 Summary of Literature Review

This chapter reviews the relevant literature in relation to the objectives of the study. The chapter has highlighted the literature that is existing in relation to completion of projects in the construction industry. The chapter has reviewed the literature in relation to the four objectives and the factors have been looked at from the global perspective. Among the highlighted factors include: Client variations, Construction Disputes, Fluctuations of construction materials prices and Weather conditions that are considered to be independent factors while completion of construction projects is taken to be the dependent variable. Finally, the research gaps are also identified in this chapter.

2.10 Research gaps

Table 2.1. Summary of findings and Research Gaps

Author	Findings	Research Gaps
Mhando et al (2017)	They found out that changes to design during construction impact the completion time of the project. Change management should be given attention to be able to control scope creep and time delays.	Notes that to date, there is a very limited research work addressing the change management issues specifically within the construction project management context.
Munyoki (2014)	Every stakeholder in construction projects implementation should be sensitized on the reality that projects will most likely suffer delay in contract duration and definitely increase in project costs.	Most literature touch on quality and cost, however, there is no literature available on the factors influencing completion of construction projects in Nairobi County.
Tulakhaba (1999)	Project delays in Kenya is linked to poor project management practices. The specific areas of deficiency are resource planning and control, estimating, and risk estimation and management.	There is need for research in the areas of project estimating and price changes to develop surrogates of measurement of these factors influencing project completion.
Acharya et al (2018)	Found that Project scheduling is one of the keys to track the delays. To achieve timely completion of a project, both the owner and the contractor must understand how the contractor plans to sequence the work and what the durations are for the different components of the work	Little literature is available on project scheduling models and impacts of lack of proper scheduling practices on the project completion time.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives the details of the research approach. It presented the research methods and procedures that were used to achieve the set objectives of the study. The research design was explained and illustrated. The target population was described as well as, sample size and sampling procedures. Also included in the chapter was data collection procedures, data collection instruments, methods of data analysis, operationalisation of variables and ethical issues observed in the research.

3.2 Research Design

According to Parahoo (2006) the design selected for research should be the one most suited so as to achieve an answer to the proposed research question. For the purpose of the proposed research question the researcher chose to use descriptive research design. As descriptive research design, it seeks to give a description, as per the data collected, of the relationship between delay of projects in the construction industry which is the dependent variable and the independent variables being variations; disputes; construction materials price fluctuations and bad weather.

3.3 Target Population

Target population as described by Sekaran (2003) is an entire group of people, events or things of interest that researchers wish to investigate. The target population in this study was the stakeholders in the commercial buildings in Westlands. The respondents in this study included project owners, consulting firms and the contracting firms. This is because they own adequate knowledge on project construction and their experiences in project performance is valuable hence their use as the target population.

The study was carried out in Westlands Sub-County, Nairobi County due to time and financial constraints and also because Nairobi is the capital city of Kenya, and compared to any other part of Kenya, Nairobi has the highest concentration of commercial buildings. In addition, for the purpose of holding certain parameters, such as climate,

constant, it was necessary to confine the study to one geographical area, in this case, Westlands.

The target commercial projects in Westlands, project owners and consulting firms involved was obtained from the County Council of Nairobi (CCN) project approval records. The study adopted the definition given by Kokemuller, (2004) for commercial building for zoning purposes as any building that is dedicated to commercial activities and that has more than half of its floor space used for commercial activities. NCC approval records also indicates the zoning of the approved project in this case the study will be looking for projects under commercial zoning.

The NCA requires all construction projects to be registered with their offices before the construction work commences. The requirements for registration of a project are; details of the contractor, details of the developer, and details of the consultants. These records finally showed the commercial buildings that have actually gone to site for construction and corresponding contracting firms. For the purposes of this study, the time frame of interest for the registered NCA projects was from January 2016 – January 2017.

From NCC’s approval records, between Jan 2016 and January 2017, there have been 93 approvals for commercial buildings in Westlands. However, going through NCA’s records for the same period, only 68 buildings were registered for construction. The researcher worked with the 68 buildings to populate the list of the respondents, i.e. project owners, consulting firms, and contracting firms.

The aggregated number of each group is as shown in table 3.1.below

Table 3.2. Target Population

Category	Frequency	Procedure	Percentage%
Project Owners	68	68/248	27
Consulting Firms	126	126/248	51
Contracting Firms	54	54/248	22
Total	248		100

Source: (Source: NCC and NCA, **January 2018**)

3.4 Sample size and Sampling Technique

3.4.1 Sample size

Sampling is selecting a given number of subjects from a defined population as representative of that population. It ensures that conclusions from the study can be generalized to the entire population. Sample size is the portion of the population to be studied in order to make an inference to a broader population to which the findings from a study are to be generalized (Araoye 2004). Where a researcher specifies the precision that he wants in respect of his estimates concerning the population parameters, e.g. confidence level, as is the case in this study, Kothari (2004) gives the below stated formula to be used for calculating a sampling size.

$$n = \frac{z^2 \cdot N \cdot \sigma_p^2}{(N - 1)e^2 + z^2 \sigma_p^2}$$

Where;

n = Size of the sample,

N = Size of the population,

e = Acceptable error (the precision) and given as 0.05,

σ_p = the standard deviation of the population and given as 0.5 where not known,

Z = Standard variate at a confidence level given as 1.96 at 95% confidence level.

The sample size for this research was obtained using the above formulae, by using the target population of 248 with a 95% confidence level and an error of 0.05.

$$n = \frac{1.96^2 * 248 * 0.5^2}{(248 - 1)0.05^2 + 1.96^2 * 0.5^2}$$
$$\frac{238.1792}{1.5779}$$
$$n = 151$$

Table 3.3. Sample Size

Category	Frequency	Percentage (%)	Procedure	Sample Size
Project Owners	68	27%	0.27*151	41
Consulting Firms	126	51%	0.51*151	77
Contracting Firms	54	22%	0.22*151	33
Total	248	100		151

3.4.2 Sampling Technique

This study adopted a stratified sampling technique because the sample size does not constitute a homogeneous group. The targeted respondents were then divided into strata (e.g. Project owners, consulting firms, and contracting firms) that are individually more homogeneous. After stratified, the study then used a proportionate sampling technique where each stratum contributed the number of respondents proportionate to the population. Finally, in each stratum, the study applied simple random sampling because in doing so the researcher made sure that each of the elements of the stratum had the same chance of being selected.

3.5 Data Collection Instrument

The researcher used questionnaires to collect data from the respondents. Gay (1996) recommends the questionnaire as a convenient and the most suitable instrument for data collection in large scale surveys as it is less expensive, and its speed of dissemination and collection. The questions were both closed ended and open ended. The open ended questions were for the cases where there was need for further clarification about the variables. The questionnaires were emailed and dropped to the respondents in their places of work and picked after a few days. The researcher opted for a questionnaire because firstly, large samples can be made use of and thus the results can be made more dependable and reliable, and secondly, it is free from the bias of the interviewer; answers are in respondents' own words and experience.

3.6 Pilot Testing of the Instrument

The first draft of the questionnaire was reviewed by the research supervisor and colleagues, and then their comments were incorporated in the second draft. The Second draft was then tested on a small pilot sample of respondents with similar characteristics as the study respondents. The piloting involved 15 respondents involved in construction projects of commercial buildings in Upperhill. Mugenda (2003) suggest that the piloting sample should represent 10% of study sample. The piloting brings to light the weaknesses (if any) of the questionnaires, e.g. questions that could be vague. From the experience gained in this way, improvement can be effected in the final version of the questionnaire.

3.6.1 Validity of the Instrument

Validity determines whether the research instrument truly measures that which it was intended to measure or how truthful the research results are (Joppe, 2000). It can be determined by using a panel of persons who shall judge how well the measuring instrument meets the standards (Kothari, 2004). To this end, the instruments were reviewed by the research supervisor to judge whether the instrument covers what it is supposed to cover. Using a pilot study, validity was measured by confirming that all respondents understood the items on the questionnaire 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.

3.6.2 Reliability of the Instrument

In this study, reliability of the instrument was measured by using the Cronbach alpha (α) method. A pilot test was conducted by collecting data from 15 subjects not included in the sample. Data collected from the pilot test was analysed using SPSS. The reliability coefficient (alpha) can range from 0 to 1, with 0 representing a questionnaire that is not reliable and 1 representing absolutely reliable questionnaire. The general convention in research has been prescribed which states that a reliability coefficient (alpha) of 0.70 or higher is considered acceptable reliability (Nunnally et al, 1994)

3.7 Data Analysis Techniques

The study was expected to generate both qualitative and quantitative data. Quantitative data was coded and entered into Statistical Packages for Social Scientists (SPSS) and analyzed using descriptive statistics. Percentages and frequencies were calculated and tables were used to illustrate figures. Qualitative data was analyzed based on the content matter of the responses. Responses with common themes or patterns were grouped together into rational categories. Content analysis was used to analyze qualitative data. The hypotheses for each independent variable was tested using the Chi-Square using the below formula:

The formula for the Chi-Square statistic used in the chi square test is:

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where:

χ^2 = The calculated Chi-Square value,

c = the degrees of freedom,

O = the observed value, and

E = the expected value.

A null hypotheses H_0 and alternative hypotheses H_1 will be formulated for each variable, which will be then used after the calculation and make a decision to reject or accept the null hypotheses.

If the calculated Chi-Square value is bigger than the one in the table, then the conclusion is that the obtained Chi-Square value is too large to have arisen by chance; In other words, the null hypothesis is rejected, and the alternative hypothesis is accepted.

If, on the other hand, the obtained Chi-Square value is smaller than the one in the table, then the null hypothesis is accepted, and the alternative hypothesis rejected.

3.8 Ethical Considerations

Research ethics is important and requires that researchers should protect the dignity of their subjects and publish well the information that is researched (Fouka & Mantzourou, 2011). This research was guided by strict adherence to research ethics which do not allow the researcher to engage in deception or invasion of privacy.

The researcher kept the identity of respondent's secret by not identifying the ethnic or cultural background of respondents, refrain from referring to them by their names or divulging any other sensitive information about a participant (Mugenda, 2003). The researcher exercised utmost honesty avoiding any fabrication, falsification or fraud of data or instrument thereby endeavoring to arrive at conclusions based on objective inferences that are purely guided by the data collected.

The researcher maintained humility and in each case, explained the purpose of the study to the respondents and the benefits that would accrue from it. The researcher also strived to uphold intellectual honesty to ensure that any work which was written should be original, and is quoted, or cited appropriately.

3.9 Operationalization of Variables

Table 3.4. Operationalization of Variables

Research Objective	Type of Variable	Indicators	Type of data analysis	Scale of Measurement
To determine the extent to which client variations influence the completion of commercial buildings construction in Westlands.	Independent Variable	Change Orders. Change budget. Project Cost Appraisal.	Descriptive,	ordinal
To establish the influence of construction disputes on completion of commercial buildings construction in Westlands.	Independent Variable	Claims. Alternative Resolution.	Descriptive,	Ordinal
To establish the extent to which fluctuation of construction materials price influence the completion of commercial buildings construction in Westlands.	Independent Variable	Inflation Crude Oil Prices Exchange Rates Import Duties	Descriptive,	Ordinal
To assess the influence of weather conditions on completion of commercial buildings constructions in Westlands.	Independent Variable	Weather records Labour Productivity Task rescheduling	Descriptive,	Ordinal
Project Completion	Dependent Variable	Construction Time Cost Client Satisfaction	Descriptive,	Ordinal

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the data that was found on factors that influence construction projects completion in Kenya using a case of commercial buildings in Westlands, Nairobi County. The research was conducted on a sample of 151 respondents to which questionnaires were administered. The data collected was keyed and analysed by simple descriptive analysis using Statistical Package for Social Scientists (SPSS) version 20.0 software. The data was then presented through frequency tables and narrative analysis., and then analysed using the Chi-Square.

4.2 Questionnaire Response Rate

This part analyzes information on the questionnaires that were returned from the field. Findings on filled in questionnaires and unreturned questionnaires are presented in Table 4.1.

Table 4.1. Response Rate

Response	Frequency	Percentage
Filled in questionnaires	109	72.2
Un returned questionnaires	42	27.8
Total Response Rate	151	100

Out of the sampled population, 109 questionnaires were returned duly filled in making a response rate of 72.2%. The response rate was representative and was adequately used to answer the research questions. According to Mugenda (2003) that a response rate above 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent.

4.3. Demographic characteristics of the respondents

The respondents' personal information included gender, age, construction profession, highest level of education, and the duration of working in the construction industry. The findings are shown in subsequent sections:

4.3.1. Distribution of Respondents by Gender

The respondents were requested to indicate their gender. Accordingly, the findings are as presented in the Table 4.2.

Table 4.2. Distribution of Respondents by Gender

	Frequency	Percentage (%)
Male	85	78.0 %
Female	24	22.0%
Total	109	100.0%

From the findings, majority (85) of the respondents were male and 24 of the respondents were female. This implies that even though some responses emanated from females, the construction industry is still male dominated.

4.3.2. Distribution of Respondents by Age

The findings based on the age of the respondents are as shown in Table 4.3

Table 4.3. Distribution of Respondents by Age

	Frequency	Percentage (%)
18-30 years	19	17.5%
31-40 years	43	39.4%
41-50 years	32	29.4%
51-60 years	13	11.9%
61-70 years	2	1.8%
Over 70 years	0	0 %
Total	109	100%

According to the findings, 39.4% of the respondents were between 31-40 years, 29.4% were 41-50 years, 17.5% were 18-30 years, 11.9% were 51-60 years, 1.8% were 61-70 years and 0 of the respondents was over 70 years. This indicates that there was a balance representation of the youth and the old in the study and therefore enhanced reliability of research findings.

4.3.3. Distribution of Respondents by Construction Profession

The respondents were asked to indicate their profession in the construction industry and the findings are as shown in Table 4.4.

Table 4.4. Construction Profession

	Frequency	Percentage (%)
Architect	26	23.9%
QS	14	12.8%
Client	22	20.2%
Engineer	9	8.3%
Contractor	18	16.5%
Project Manager	20	18.3%
Total	109	100%

According to the findings, most of the respondents 26 (23.9%) were architects, 20 (18.3%) were project managers, 9 (8.3%) were engineers, 22 (20.2%) were clients, 18 (16.5%) were contractors while 14 (12.8%) were quantity surveyors. This information shows that most all the targeted groups within the sample frame were also represented in the returned questionnaires.

4.3.4. Distribution of participants by Level of Education

The respondents were requested to indicate their highest level of education. The findings on analysis of respondent's level of education has been presented on Table 4.5

Table 4.5. Distribution of participants by Level of Education

	Frequency	Percentage (%)
Secondary	4	3.7%
Vocational training	8	7.4%
Diploma	19	17.4%
Degree	51	46.8%
Masters	27	24.7%
Total	109	100%

From the findings, majority of the respondents, 46.8%, were holding a bachelor's degree, followed by 24.7% with masters' degree, 17.4% had diploma, 7.4% vocational training and 3.7% with secondary education. This implies that respondents were well knowledgeable with majority having minimum of a bachelor's degree training and hence higher chances of getting reliable data.

4.3.5 Duration of working in Construction Industry

The findings on how long respondents had worked in the construction industry are as shown in Table 4.6.

Table 4.6. Duration of working in Construction Industry

	Frequency	Percentage
Less than a year	4	3.7%
between 1-5 years	38	34.8%
over 5 years	67	61.5%
Total	109	100%

Based on the findings, 3.7% of the respondents had worked in construction industry for less than a year, 34.8 of the respondents had worked in the construction industry for between 1-5 years, while 61.5% of the respondents had worked in the construction industry for over 5 years. This illustrates that the most of the respondents had worked in construction industry for duration of over 5 years and therefore had accumulated a lot of knowledge and skills over time.

4.4. Client Variations

This section presents findings on client variations. The findings are presented in the following subsections

4.4.1. Effect of Client Variations on Completion of Construction Projects

The respondents were requested to state whether client variations affect completion of construction projects. The findings are summarized in the Table 4.7.

Table 4.7: Effect of Client Variations on Completion of Construction Projects

	Frequency	percentage
Yes	82	75.3%
No	16	14.6%
Not Sure	11	10.1%
Total	109	100%

As illustrated in Table 4.7, 82 (75.3%) of the respondents agreed that client variations affect completion of construction projects while 16 (14.6%) of them were of contrary opinion. 10.1% were not sure whether client variations affect the completion of the projects. This depicts that client variations affect completion of construction projects.

4.4.2. Factors on Client Variations and Completion of Commercial Buildings

The respondents were asked to rate the extent to which the various factors on client variations have contributed to completion of commercial buildings; the responses were placed on a five Likert scale; where 1= no extent, 2= little extent, 3=moderate extent, 4= great extent, 5= very great extent.

Table 4.8. Factors on Client Variations and Completion of Commercial Buildings

Statements	Mean	Std
Client Changes that have design implications have time impact	4.21	0.358
Client's Financial Problems	4.01	0.328
Change of Project Scope by Client	3.90	0.256
Lack of Client Prompt Decision Making	3.79	0.247

From the findings in Table 4.8, the respondents indicated to a great extent that; client changes that have design implications and have time impact (mean=4.21), followed by client's financial problems (mean=4.01), change of project scope by client (mean=3.90), and lack of client prompt decision making (mean=3.79). This implies that to a great extent that client changes have design implications and has time impact.

4.4.3. Extent to which Client Variations Influence the Completion of Commercial Buildings Constructions

The respondents were requested to indicate the extent to which client variations influence the completion of commercial buildings constructions. The findings are shown in table 4.9

Table 4.9. Extent of influence of Client Variations on Completion of Constructions

	Frequency	Percent
Very Great Extent	57	52.3%
Great Extent	19	17.4%
Moderate Extent	12	11.0%
Little Extent	15	13.8%
No Extent	6	5.5%
Total	109	100%

From the findings in Table 4.9, most of the respondents, 52.3%, indicated that to a very great extent that client variations influence the completion of commercial buildings constructions, 17.4% indicated great extent, 11.0% indicated moderate extent, 13.8% indicated little extent, while 5.5% indicated no extent. This depicts that to a great extent that client variations influence the completion of commercial buildings constructions.

When asked to give reasons for the above responses, respondents said that, during construction, redesign work occurs and is done by means of architect's instructions. Clients come with new ideas, or changes to the original scope that must be implemented. When such changes are incorporated in the existing design, the affected areas of the construction must be stopped for a period of time as rescheduling of the tasks is being done. In most cases, this results in some form of delays, from what was originally scheduled.

4.4.4. Testing Hypothesis Using Chi-Square

Null hypothesis: H_0 : Client variations has NO significant influence on the completion of commercial buildings construction in Westlands.

Alternative hypothesis: H_1 : Client variations has a significant influence on the completion of commercial buildings construction in Westlands.

Table 4.10. Showing Observed and Expected Responses

Scale	VGE	GE	ME	LE	NE
Observed (O)	57	19	12	15	6
Expected (E)	30.2	30.2	30.2	30.2	30.2

Expected value (E) 30.2 is arrived at by dividing the sample size, 151, by 5, the range of the Likert Scale being used i.e. $(151/5 = 30.2)$

Table 4.11. Testing for the First Hypothesis

O	E	(O-E)	(O-E) ²	(O-E) ² /E
57	30.2	26.8	718.24	23.78
19	30.2	-11.2	125.44	4.15
12	30.2	-18.2	331.24	10.96
15	30.2	-15.2	231.04	7.65
6	30.2	-24.2	585.64	19.39
			$\Sigma(O-E)^2/E$	65.93

calculated value of $\chi^2 = 65.93 >$ table value of $\chi^2 = 9.49$ at 4 degrees of freedom and 5% level of confidence. Since the calculated chi-square value of 65.93 is greater than the table chi-square value of 9.49 at 5% level of confidence, we reject the null hypothesis and accept the alternative hypothesis. Thus, client variations has a significant influence on the completion of commercial buildings construction in Westlands.

4.5. Construction Disputes

This section presents findings on construction disputes. The findings are presented in the following subsections

4.5.1. Experience of Construction Disputes in Construction Projects

The respondents were asked to indicate whether they have ever experienced construction disputes in construction projects in the region. The findings are as tabulated.

Table 4.12. Experience of Construction Disputes in Construction Projects

	Frequency	Percent
Yes	88	80.7%
No	21	19.3%
Not Sure	0	0%
Total	109	100%

From the findings, 88 of the respondents, or 80.7% agreed that they have ever experienced construction disputes in construction projects in the region while 21 of them, or 19.3% were of the contrary opinion. None of the respondents said they were not sure. This implies that majority of the respondents have experienced construction disputes in construction projects in the region.

4.5.2. Extent to which Construction Disputes influence the Completion of Constructions

The respondents were requested to indicate the extent to which construction disputes influence the completion of commercial buildings constructions. The findings are shown in table 4.13

Table 4.13. Extent of influence of Construction Disputes on Completion of Constructions

	Frequency	Percent
Very Great Extent	41	37.6%
Great Extent	45	41.4%
Moderate Extent	14	12.8%
Little Extent	8	7.3%
No Extent	1	0.9%
Total	109	100%

From the findings in Table 4.13, majority (41.4%) of the respondents indicated to a great extent that construction disputes influence the completion of commercial buildings constructions, 37.6% indicated very great extent, 12.8% indicated moderate extent, 7.3% indicated little extent, while 0.9% indicated no extent. This depicts that to a great extent, construction disputes influence the completion of commercial buildings constructions.

Respondents were asked to comment on their reasons above. It was noted that while disputes are common in construction projects, their causes of delays are largely because they are not dealt with in good time. Others noted that methods of collecting and keeping daily records, if properly implemented will greatly reduce the disputes occurring in construction projects. Others also raised the issue of incompetency of contractors and project managers in dealing with disputes as a cause of disputes and hence delays.

4.5.3. Extent of Agreement on Construction Disputes

The respondents were asked the extent to which they agree with the statements on construction disputes; the responses were placed on a five Likert scale; where 1=strongly disagree, 2= disagree, 3=Uncertain, 4=agree, 5= strongly agree.

Table 4.14. Extent of Agreement on Construction Disputes

Statements	Mean	Std
The method of dispute resolution agreed to, affects project completion	3.89	0.128
There is no proper dispute management strategies in the project	3.54	0.115
Incompetency of Project Managers in handling disputes can lead to	3.77	0.189
Adequate time is not allocated to deal with disputes as they arise	3.61	0.107

From the findings in Table 4.14, the respondents agreed that the method of dispute resolution agreed to, affects project completion (mean=3.89) and a very small standard deviation of 0.12, followed by incompetency of project managers in handling disputes (mean=3.77), adequate time is not allocated to deal with disputes as they arise (mean=3.61), and there is no proper dispute management strategies in the project (mean=3.54).

4.5.4. Testing Hypothesis Using Chi-Square

Null hypothesis: H₀: Construction disputes has NO significant influence on the completion of commercial buildings construction in Westlands.

Alternative hypothesis: H₂: Construction disputes has a significant influence on the completion of commercial buildings construction in Westlands.

Table 4.15. Showing Observed (from table 4.13) and Expected Responses

Scale	VGE	GE	ME	LE	NE
Observed (O)	41	45	14	8	1
Expected (E)	30.2	30.2	30.2	30.2	30.2

Expected value (E) 30.2 is arrived at by dividing the sample size, 151, by 5, the range of the Likert Scale being used i.e. (151/5= 30.2)

Table 4.16. Testing for the Second Hypothesis

O	E	(O-E)	(O-E) ²	(O-E) ² /E
41	30.2	10.8	116.64	3.86
45	30.2	14.8	219.04	7.25
14	30.2	-16.2	262.44	8.69
8	30.2	-22.2	492.84	16.32
1	30.2	-29.2	852.64	28.23
$\Sigma(O-E)^2/E$				64.35

Calculated value of $\chi^2 = 64.35 >$ table value of $\chi^2 = 9.49$ at 4 degrees of freedom and 5% level of confidence. Since the calculated chi-square value of 64.35 is greater than the table chi-square value of 9.49 at 5% level of confidence, we reject the null hypothesis and accept the alternative hypothesis. Thus, construction disputes has a significant influence on the completion of commercial buildings construction in Westlands.

4.6. Construction Materials Price Fluctuations

This section presents findings on construction materials price fluctuations. The findings are presented in the following subsections

4.6.1 Effect of Construction Materials Price Fluctuations on Completion of Buildings

The respondents were asked to indicate whether construction materials price fluctuations influence completion of commercial buildings. The findings are as tabulated.

Table 4.5. Effect of Construction Materials Price Fluctuations on Completion of Buildings

	Frequency	Percent
Yes	57	52.3%
No	45	41.3%
Not sure	7	6.4%
Total	109	100%

From the findings, 52.3% of the respondents agreed that construction materials price fluctuations influence completion of commercial buildings, 41.3% of them were of the contrary opinion, while 6.4% were not sure. This implies that majority of the respondents agreed that construction materials price fluctuations influence completion of commercial buildings.

Respondents were asked how price fluctuation influence the completion of buildings. Common responses were that contractors who do not factor in this risk are forced to stop work when prices go up, and thus causing time delays. It was also observed that the most affected projects are when construction materials have to be imported, this will suffer significant price increases due to exchange rates, as a result, contractors take time to import these items.

4.6.2. Extent to which Construction Materials Price Fluctuations Influence the Timely Completion of Commercial Buildings

The respondents were requested to indicate the extent to which construction materials price fluctuations influence the timely completion of commercial buildings. The findings are shown in table 4.18

Table 4.6. Extent of influence of Construction Materials on Completion of Buildings

	Frequency	Percent
Very Great Extent	27	24.7%
Great Extent	32	29.4%
Moderate Extent	6	5.5%
Little Extent	5	4.6%
No Extent	39	35.8%
Total	109	100%

From the findings in Table 4.18, 35.8% of the respondents indicated to no extent does the construction materials price fluctuations influence the timely completion of commercial buildings, 29.4% indicated great extent, 24.7 % indicated very great extent, while 5.5% and 4.6% indicated moderate extent, and little extent respectively. This depicts that on

average, the construction materials price fluctuations influence the timely completion of commercial buildings, although a reasonable number, at 35.8% do not agree.

4.6.3. Extent to Which Factors on Materials Price Fluctuations have Contributed to Completion of Construction of Commercial Buildings

The respondents were asked the extent to which factors on materials price fluctuations have contributed to delays in construction of commercial buildings; the responses were placed on a five Likert scale; where 1=no extent, 2= little extent, 3=moderate extent, 4=great extent, 5= very great extent.

Table 4.7. Materials Price Fluctuations and Delays in Construction of Buildings

Statements	Mean	Std
The contractor did not factor in price fluctuations in contract sum	4.02	0.432
Government policy e.g. import duties	3.99	0.421
Political situation of the country e.g. electioneering period	4.12	0.453
Projects in the region have been delayed due to Inflation	3.86	0.415

From the findings in Table 4.19, the respondents indicated to a great extent that political situation of the country e.g. electioneering period contributed to delays in construction of commercial buildings (mean=4.12), followed by the contractor did not factor in price fluctuations in contract sum (mean=4.02), government policy e.g. import duties (mean=3.99), and projects in the region have been delayed due to Inflation (mean=3.86).

4.6.4. Testing Hypothesis Using Chi-Square

Null hypothesis: H_0 : Fluctuation of construction materials prices has NO significant influence on the completion of commercial buildings construction in Westlands.

Alternative hypothesis: H_3 : Fluctuation of construction materials prices has significant influence on the completion of commercial buildings construction in Westlands.

Table 4.20. Showing Observed (from table 4.18) and Expected Responses

Scale	VGE	GE	ME	LE	NE
Observed (O)	27	32	6	5	39
Expected (E)	30.2	30.2	30.2	30.2	30.2

Expected value (E) 30.2 is arrived at by dividing the sample size, 151, by 5, the range of the Likert Scale being used i.e. (151/5= 30.2)

Table 4.21. Testing for the Third Hypothesis

O	E	(O-E)	(O-E) ²	(O-E) ² /E
27	30.2	-3.2	10.24	0.34
32	30.2	1.8	3.24	0.11
6	30.2	-24.2	585.64	19.40
5	30.2	-25.2	635.04	21.02
39	30.2	8.8	77.44	2.56
$\Sigma(O-E)^2/E$				43.43

Calculated value of $\chi^2 = 43.43 >$ table value of $\chi^2 = 9.49$ at 4 degrees of freedom and 5% level of confidence. Since the calculated chi-square value of 43.43 is greater than the table chi-square value of 9.49 at 5% level of confidence, we reject the null hypothesis and accept the alternative hypothesis. Thus, Fluctuation of construction materials prices has significant influence on the completion of commercial buildings construction in Westlands.

4.7 Weather Conditions

This section presents findings on weather conditions and construction of commercial buildings. The findings are presented in subsequent sections

4.7.1 Experience of Delays Caused by Weather

The respondents were asked to indicate whether they have experienced construction delays caused by weather conditions in construction of commercial buildings. The findings are as tabulated.

Table 4.22. Experience of Delays Caused by Weather

	Frequency	Percent
Yes	102	93.6%
No	7	15.4%
Not sure	0	0%
Total	109	100%

From the findings, 93.6% of the respondents indicated that they have experienced construction delays caused by weather conditions in construction of commercial buildings while 15.4% of them had not experience any delays related to weather. This implies that the vast majority of the respondents have experienced construction delays caused by weather conditions in construction of commercial buildings.

The respondents were then asked how weather influences completion of construction projects. It was noted that rain usually stops construction of any work that is external. Delays can run up to days when its during rainy conditions. Some noted that access to sites during such conditions becomes difficult and material delivery is hampered resulting into delays.

4.7.2. Extent to Which Weather Conditions Influence Completion of Commercial Buildings

The respondents were requested to indicate the extent to which weather conditions influence the timely completion of commercial buildings. The findings are shown in table 4.23

Table 4.23. Extent of influence of Weather Conditions on Completion of Buildings

	Frequency	Percent
Very Great Extent	24	22.0%
Great Extent	42	38.5%
Moderate Extent	23	21.1%
Little Extent	17	15.6%
No Extent	3	2.8%
Total	109	100%

From the findings in Table 4.23, 38.5% of the respondents indicated to a great extent weather conditions influence the timely completion of commercial buildings, 22% indicated to a very great extent, 21.1 % indicated moderate extent, while 15.6% and 2.8% indicated little extent, and no extent respectively. This depicts that on average, most of the respondents believe weather conditions influence the completion of construction projects.

4.7.3. Influence of weather conditions on completion of construction of commercial buildings

The respondents were asked to indicate the level of agreement on statements relating to influence of weather conditions on completion of construction of commercial buildings; the responses were placed on a five Likert scale; where 1=Strongly disagree, 2= disagree, 3=Uncertain, 4=agree, 5= Strongly agree.

Table 4.24. Influence of weather conditions on completion of commercial buildings

Statements	Mean	Std
Rainy conditions have caused delays of projects in the region	4.45	0.563
Hot conditions affect the rate of work in the region	4.02	0.504
Unpreparedness of contractor to deal with poor weather results in	4.34	0.551
Weather conditions not factored in the schedule causes delays	4.28	0.556

From the findings in Table 4.24, the respondents agreed that rainy conditions have caused delays of projects in the region (mean=4.45), followed by unpreparedness of contractor to deal with poor weather results in project (mean=4.34), weather conditions not factored in the schedule causes delays (mean=4.28), and hot conditions affect the rate of work in the region (mean=4.02). This implies that rainy conditions have caused delays of projects in the region.

4.7.4. Testing Hypothesis Using Chi-Square

Null hypothesis: H_0 : Weather conditions has NO significant influence on the completion of commercial buildings constructions in Westlands.

Alternative hypothesis: H_4 : Weather conditions has a significant influence on the completion of commercial buildings constructions in Westlands.

Table 4.25: Showing Observed (from table 4.23) and Expected Responses

Scale	VGE	GE	ME	LE	NE
Observed (O)	24	42	23	17	3
Expected (E)	30.2	30.2	30.2	30.2	30.2

Expected value (E) 30.2 is arrived at by dividing the sample size, 151, by 5, the range of the Likert Scale being used i.e. $(151/5 = 30.2)$

Table 4.26: Testing for the Fourth Hypothesis

O	E	(O-E)	(O-E) ²	(O-E) ² /E
24	30.2	-6.2	38.44	1.27
42	30.2	11.8	139.24	4.61
23	30.2	-7.2	51.84	1.72
17	30.2	-13.2	174.24	5.77
3	30.2	-27.2	739.84	24.50
			$\Sigma(O-E)^2/E$	37.87

Calculated value of $\chi^2 = 37.87 >$ table value of $\chi^2 = 9.49$ at 4 degrees of freedom and 5% level of confidence. Since the calculated chi-square value of 37.87 is greater than the table chi-square value of 9.49 at 5% level of confidence, we reject the null hypothesis and accept the alternative hypothesis. Thus, weather conditions has a significant influence on the completion of commercial buildings constructions in Westlands.

CHAPTER FIVE:
SUMMARY OF THE FINDINGS, DISCUSSIONS, CONCLUSIONS AND
RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of the findings, discussions, conclusions of the research as analysed in chapter four, and recommendations for further research suggested. The discussions will be guided by the research objectives and whether the data confirms the research questions.

5.2 Summary of the Findings

The aim of this study was to establish the factors affecting construction projects completion in Kenya. From an analysis and review of the research data and data gathered through questionnaires filled, issues that follow become evident.

The first objective sought to determine the extent to which client variations influence the completion of construction of commercial buildings and from the responses, 75.3% of respondents agreed with the idea that client variations does affect the completion of construction projects, 14.6% went for no while those who were not sure made 10.1% of the responses. The respondents were also asked to give the extent to which they agreed with the objective, only 5.5% of the respondents said to no extent. When asked to give reasons for the above answers, the respondents argued that clients often change design and scopes of the project during construction and it takes time to implement these changes. During this time, the areas that the changes affect are put on hold, and as a result, rescheduling has to be done, and ultimately leading to delays as the original date of completion of a task is not realised. Others argued that in cases where time is not lost, quality will be compromised to achieve the work in the same time, and the cost of the project will also go up because of more labour needed.

In relation to the second objective that sought to establish the influence of construction disputes on the completion of commercial buildings construction, the following responses became apparent. Only 1 out of 109 respondents indicated that construction disputes

influence the completion of commercial buildings constructions to no extent, 41 indicated very great extent, 45 respondents said to a very great extent, 14 indicated moderate extent, while 8 indicated little extent. Asked to comment on the issue, respondents argued that disputes occur over issues such as poor quality of work and variations to design, quality or quantity of the work. Contractors often submit claims to clients on issues they feel they need compensation such as on extra works, and loss and expenses incurred. The client often queries such claims on account of either their legality or evaluation, and clients may also make counter claims against the contractor. This eventually does lead to stopping of disputed work, eventually causing delays as an amicable solution is sort.

The third objective sought to establish the extent to which fluctuation of construction materials price influence the completion of commercial buildings. The study found that 52.3% of the respondents agreed that construction materials price fluctuations influence completion of commercial buildings, a high percentage at 41.3% of the respondents did not agree, while 6.4% of the respondents were undecided. The respondents who agreed with this statement noted that when there is inflation, material prices go up, and this leads to contractors struggling to supply the materials, especially if it is higher than the quoted cost. This causes delays as the contractors look for alternatives. Those who did not agree with the statement noted that experienced contractors anticipate these risk and thus factor it in the pricing. They further argue that contingency figures should be able to cushion the contractor on price fluctuations.

In regard to the last objective, which was to assess the influence of weather conditions on the completion of commercial buildings constructions, an overwhelming 102 out of 109 respondents agreed that weather conditions affect the completion of construction projects. Only 7 respondents were of the contrary opinion. Majority of the respondents noted that rain is the biggest factor and causes stoppage of construction works such as in situ concreting, makes structural steel slippery and hazardous, warps wooden forms, and creates havoc with finishing and electrical materials especially if work places are external. Rain also renders construction sites inaccessible to both personnel and

materials. Thus, if it starts raining, work in this areas must stop, resulting in rescheduling and delays for the period that the work was not going on.

5.3 Discussion of Findings

The findings of the study have shown that there is a significant link between the objectives and what is seen in chapter four. The hypothesis tests have shown that the variables significantly affect completion of the projects and from the respondents' discussions, these variables affect the completion by causing delays. This agrees with research done by other scholars. Client variations, construction disputes, construction materials price fluctuations and weather conditions will largely affect a successful completion of a construction project.

A project that experiences client variations at the construction stage will most likely suffer time delays (Munyoki 2014). Client variations are problems associated with the development of project briefs. In most cases project briefs are not well developed before the commencement of design and construction. In some projects, the clients issue change notices because of change of mind. These kinds of instructions show lack of proper advice from the client's consultants. There is also the possibility that clients are not aware of the implications of issuing instructions even if the brief is well developed. When data was analysed, client changes that have design implications, have time impact and were noted to have a mean of 4.21 and a small standard deviation of 0.358. This implies that any change in design is most likely to have a time impact. This, further agrees with a study by Ming et al. (2004) who stated that major problems faced by the construction project is the issue of the variation order occurring during the construction phase which results in delaying projects and overruns the cost. Clients should therefore, be aware of the implications and effects of issuing unnecessary change instructions.

The findings on the second objective show that 80.7% of respondents have experienced disputes on construction projects, while 19.3% have not. However, the respondents noted that the method of dispute resolution agreed to, affects project completion, at the highest mean of 3.89. This indicates that if proper approaches of dealing with disputes are

employed, then the project completion will not be greatly affected. According to Shin (2000), managing disputes should become a part of 'normal' project management during project constructions because disputes in construction project are common place and if not properly managed, will have a significant increase in the project delivery time. Having no disputes in a project would be considered the ideal situation, but in most cases, it is not the reality. Therefore, project managers should start taking dispute matters more seriously for successful project completion.

The study shows that 35.8% of respondents do not think that material price fluctuations affects completion of projects to any extent. This means that 64.2% agree with the objective. This underlines the findings of a study by Oghenekevwe et al (2014), which noted that inflationary increase in the price of construction materials has been one of the major contributing factors to frequent cost overruns and subsequently project abandonment and delays. Idoro et al (2010) found that building materials alone account for 50% to 60% of project cost and control about 80% of its schedule. This therefore means that increase in the cost of materials will affect the total cost of construction and when contractors cannot supply the materials in good time, then a better part of the project schedule is under threat of delay.

Majority of the respondents at 93.6% have experienced construction delays caused by weather conditions in construction of commercial buildings. Table 4.24 shows that rain (wet conditions) is the dominant cause of disruptions. Hot and, cold temperatures, wind and others are not frequent. This confirms the significance of rain as a cause of delays mainly because construction projects, in general, are executed in an outdoor environment. For instance, delivery of materials to site will most definitely be affected by wet conditions. The use of cranes in lifting construction materials can be stopped in cases of heavy winds and thereby affecting activities that are being undertaken on higher floors of construction project. Benjamin et al. (1973) suggested that almost 50% of construction activities are sensitive to weather conditions. Thus, if work is stopped because of weather conditions, then the progress of the construction will be affected negatively leading to likely time delays.

5.4 Conclusions

The construction organizations should always aim to complete projects successfully throughout the project as failures in construction projects are costly and often result in disputes, claims and delays. Every stakeholder in construction projects implementation should be sensitized on the reality that projects will most likely suffer delay in contract duration and efforts should be made to avoid all the contributors to this threat.

5.5 Recommendations

1. Based on the findings of the study that has come from the respondents in the field and the literature review, competent and experienced project managers should be hired. Appointment of project managers should not only emphasise the professional expertise but also further reference on the success of the project manager based on experience should be conducted by scrutinising past project success in terms of cost, time and quality performance.
2. The experience of the contractors should be scrutinized, their track records be well understood and proper procedures of testing these contractor's experience be checked. This will ensure that they have a history industry good standing to deliver well on their contract agreements. If they show a sign of cash flow problems, they are not to be picked to implement a project.
3. Project team members should be trained on factors that influence successful completion of construction projects, focussing on training at all levels of the construction industry. The training should aim at upgrading the skills for better and proven methods of project management as well as efficient performance of trades.
4. The other aspect is the promotion of research interest in the construction industry in Kenya. The research attribute will provide the training and review attributes with the necessary findings and recommendations that will form a basis for implementation in those areas. The research should be continuous and to cover all areas of project and construction management including procurement, methods and techniques, resources, risks and environment.

5.6 Suggestions for Further Research

This study suggests a research to device units of measurement that can quantify the delay causing factors, and establish the optimum required for project success. This may form a basis for developing a benchmark not only for project funding and achievability enhancement but also project viability and desirability.

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APPENDICES

APPENDIX I: LETTER OF TRANSMITTAL

Collins Atego

P.O Box 8658-00100

Nairobi.

Tel: 0722816558

Email: cjatego@gmail.com

Dear participant,

My name is Collins Atego and I am a student at the University of Nairobi, Nairobi Campus undertaking a Master of Arts Degree in Project Planning and Management. To fulfill the completion of this course, I am carrying out a study on factors affecting construction projects completion in Kenya while looking at a case of commercial buildings in Westlands region, Nairobi County. I am inviting you to participate in this research study by completing the attached questionnaire.

If you choose to participate in this research, please answer all questions as honestly as possible.

Participation is strictly voluntary and you may decline to participate at any time. In order to ensure that all the information will remain confidential, you do not have to include your name. The data collected will be for academic purposes only.

Thank you.



Collins Atego

Registration Number: L50/88677/2016

APPENDIX II : UNIVERSITY INTRODUCTION LETTER



UNIVERSITY OF NAIROBI
OPEN DISTANCE AND e- LEARNING CAMPUS
SCHOOL OF OPEN AND DISTANCE LEARNING
DEPARTMENT OF OPEN LEARNING
NAIROBI LEARNING CENTRE

Your Ref:
Our Ref:
Telephone: 318262 Ext. 120

Main Campus
Gandhi Wing, Ground Floor
P.O. Box 30197
NAIROBI

19th July, 2018

REF: UON/ODeL/NLC/29/068

RE: COLLINS ATEGO- REG NO.L50/88677/2016

The above named is a student at the University of Nairobi Open, Distance and e-Learning Campus, School of Open and Distance Learning, Department of Open Learning pursuing Master of Arts in Project Planning and Management.

He is proceeding for research entitled, **Factors Affecting Construction Projects Completion in Kenya: A Case of Commercial Buildings in Westlands Sub County, Nairobi County.**

Any assistance given to him will be appreciated.



CAREN AWILLY
CENTRE ORGANIZER
NAIROBI LEARNING CENTRE

APPENDIX III: QUESTIONNAIRE

Topic

FACTORS AFFECTING CONSTRUCTION PROJECTS COMPLETION IN KENYA:
A CASE OF COMMERCIAL BUILDINGS IN WESTLANDS SUB COUNTY,
NAIROBI COUNTY.

SECTION A. DEMOGRAPHIC INFORMATION

- 1. Gender: Male () Female ()
- 2. Age: 18-30yrs () 31-40yrs () 41-50yrs () 51-60yrs () 61-70yrs () Over 70yrs
- 3. Please indicate the construction profession you are in

Architect		QS		Client	
Engineer		Contractor		Project Manager	

- 4. Highest Level of education:
Secondary () Vocational Training () Diploma () Degree () Masters ()
Other () Please specify _____
- 5. How long have you worked in the construction industry:
Less than 1 year () 1-5 years () above 5 years

SECTION B. CLIENT VARIATIONS

- 6. Clearly state whether you agree with the following in regard to client variations and project completion. Do client variations affect completion of construction projects?
Yes () No () Not Sure ()

7. Using a scale of 1 to 5, rate the extent to which the following factors on client variations have contributed to completion of commercial buildings?

1= No Extent, 2= Little Extent, 3=Moderate Extent, 4= Great Extent, 5= Very Great

Extent

	1	2	3	4	5
Client Changes that have design implications have time impact					
Client's Financial Problems					
Change of Project Scope by Client					
Lack of Client Prompt Decision Making					

8. To what extent do client variations influence the completion of commercial buildings constructions?

Very Great Extent	
Great Extent	
Moderate Extent	
Little Extent	
No Extent	

9. Give a supporting reason for 8 above

SECTION C. CONSTRUCTION DISPUTES

10. Have you experienced construction disputes in construction projects in the region?

Yes () No () Not Sure ()

11. What is the extent to which construction disputes influence the completion of commercial buildings constructions?

Very Great Extent	
Great Extent	
Moderate Extent	
Little Extent	
No Extent	

12. Give a reason for your answer above

13. Using a scale of 1 to 5, Indicate the degree to which you agree or disagree with the below statements. 1=strongly disagree, 2= disagree, 3=Uncertain, 4=agree, 5= strongly agree

	1	2	3	4	5
The method of dispute resolution agreed to, affects project completion					
There is no proper dispute management strategies in the project					
Incompetency of Project Managers in handling disputes can lead to project delays					
Adequate time is not allocated to deal with disputes as they arise					

SECTION D. CONSTRUCTION MATERIALS PRICE FLUCTUATIONS

14. Do construction materials price fluctuations affect the completion of commercial buildings?

Yes () No () Not Sure ()

15. If the answer to question (14) above is Yes, how does price fluctuations affect the completion of the projects.

16. Indicate the extent to which construction materials price fluctuations influence the timely completion of commercial buildings.

Very Great Extent	
Great Extent	
Moderate Extent	
Little Extent	
No Extent	

17. Using a scale of 1 to 5, rate the extent to which the following factors on materials price fluctuations have contributed to delays in construction of commercial buildings in Westlands?

1=No Extent, 2= Little Extent, 3=Moderate Extent, 4=Great Extent, 5= Very great Extent

	1	2	3	4	5
The contractor did not factor in price fluctuations in contract sum.					
Government policy e.g. import duties.					
Political situation of the country e.g. electioneering period.					
Projects in the region have been delayed due to Inflation					

SECTION E. WEATHER CONDITIONS

18. Have you experienced construction delays caused by weather conditions in construction of commercial buildings?

Yes () No () Not Sure ()

19. If the answer to (18) above is Yes, how does weather conditions affect the completion of construction projects?

20. What is the extent to which weather conditions influence the completion of commercial buildings constructions in Westlands?





Very Great Extent	
Great Extent	
Moderate Extent	
Little Extent	
No Extent	

21. Below are several statements on the Influence of weather conditions on completion of construction of commercial buildings. Using a scale of 1 to 5, Indicate the degree to which you agree or disagree with the statements.

1=Strongly disagree, 2= disagree, 3=Uncertain, 4=agree, 5= Strongly agree

	1	2	3	4	5
Rainy conditions have caused delays of projects in the region.					
Hot conditions affect the rate of work in the region.					
Unpreparedness of contractor to deal with poor weather results in project delays.					
Weather conditions not factored in the schedule causes delays.					

APPENDIX IV: NACOSTI PERMIT

<p>CONDITIONS</p> <ol style="list-style-type: none">1. The License is valid for the proposed research, research site specified period.2. Both the Licence and any rights thereunder are non-transferable.3. Upon request of the Commission, the Licensee shall submit a progress report.4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.6. This Licence does not give authority to transfer research materials.7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.	 <p>REPUBLIC OF KENYA</p>  <p>National Commission for Science, Technology and Innovation</p> <p>RESEARCH CLEARANCE PERMIT</p>
<p>THIS IS TO CERTIFY THAT: MR. COLLINS OTIENO ATEGO of UNIVERSITY OF NAIROBI, 0-254 Nairobi, has been permitted to conduct research in Nairobi County</p> <p>on the topic: FACTORS AFFECTING CONSTRUCTION PROJECTS COMPLETION IN KENYA: A CASE OF COMMERCIAL BUILDINGS IN WESTLANDS SUB COUNTY, NAIROBI COUNTY</p> <p>for the period ending: 24th July, 2019</p> <p>..... Applicant's Signature</p>	<p>Permit No : NACOSTI/P/18/75478/24272 Date Of Issue : 24th July, 2018 Fee Recieved : Ksh 1000</p>  <p> Director General National Commission for Science, Technology & Innovation</p>

APPENDIX V: NACOSTI AUTHORIZATION



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 3310571, 2219420
Fax: +254-20-318245, 318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Wanyuki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No **NACOSTI/P/18/75478/24272**

Date: **24th July, 2018**

Collins Otieno Atego
University of Nairobi
P.O Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Factors affecting construction projects completion in Kenya: A case of commercial buildings in Westlands Sub County, Nairobi County,”* I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **24th July, 2019.**

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.


BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

FOR The County Commissioner
Nairobi County. *FAITH A. OLYARUA*
[Signature]

COUNTY COMMISSIONER
NAIROBI COUNTY
Box 30124-00100, NAI
TEL: 345166

The County Director of Education
Nairobi County.

National Commission for Science, Technology and Innovation is ISO9001:2008 Certified

APPENDIX VI: MINISTRY OF EDUCATION AUTHORIZATION



**Republic of Kenya
MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING & BASIC EDUCATION**

Telephone: "SCHOOLING", Nairobi
Telephone: Nairobi 020 2450499
Email: education@kenya.go.ke
education.go.ke

When replying please quote

REGIONAL COORDINATOR OF EDUCATION
NAIROBI REGION
NYAYO HOUSE
P.O. Box 7427 - 00100
NAIROBI

Ref: **RCE/NRB/GEN/I/VOL.1**

Date: **26th July, 2018**

Collins Otieno Atego
University of Nairobi
P O Box 30197-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

We are in receipt of a letter from the National Commission for Science, Technology and Innovation regarding research authorization in Nairobi County on "**Factors affecting construction projects completion in Kenya: A case of commercial buildings in Westlands Sub County, Nairobi County**".

This office has no objection and authority is hereby granted for a period ending **24th July, 2019** as indicated in the request letter.

Kindly inform the Sub-County Director of Education of the Sub County you intend to visit.



**KINOTI KIOGORA
FOR: REGIONAL COORDINATOR OF EDUCATION
NAIROBI**

C.C.

Director General/CEO
Nation Commission for Science, Technology and innovation
NAIROBI