IDENTIFYING CAUSES OF COST OVERRUNS IN NON-TRADITIONAL CONTRACTS IN KENYA.

BY

JACK W. WAIHENYA, B.A. (BUILDING ECONOMICS) REGISTERED QUANTITY SURVEYOR.

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DECLARATION

I hereby declare that this thesis is my original work and has not been presented for a degree in any other university.

Signed.----------
Jack Wachira Waihenya.

DECLARATION OF SUPERVISOR

This thesis has been submitted for examination with my approval as university supervisor.

Signed ----------
Dr. - Ing. Chris.M.Mbatha.

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ABSTRACT

Cost overruns in construction projects in Kenya frustrate the process of development for it ties finance in unfinished projects, diminishes returns to developers and causes problems of mortgage servicing.

The causes of cost overruns and their significance in traditional building contracts have been established by various studies carried before but the causes of cost overruns in non-traditional building contracts have not been established.

Numerous benefits have been claimed to accrue from the use of the traditional building contracts particularly with regard to the three pillars of project performance namely, cost, quality and time. The author found it therefore necessary to study a number of construction projects where the non- traditional contract have been used and determine whether the causes of cost overruns and their significance in traditional contracts are similar or not to non- traditional contracts.

The findings have shown that the causes and significance of cost overruns in non-traditional contracts are different from traditional contracts and that non- traditional contracts performed better in terms of adherence to budgets. These findings have been validated by statistical test of hypothesis.

It was observed that the major causes of cost overruns in non- traditional contracts are, variation in the cost of building materials, changes in the design of the building, changes

in finishes by the client, contractor running out of money to run the project for sometime, hiring of extra tools during construction not anticipated, under estimation of the cost of construction by the quantity surveyor (in that order of merit).

The study also observed that causes by the contractor, client, quantity surveyor, architect, structural engineer and clerk of works in that order have the greatest influence on cost overruns among the project implementation team in a non- traditional contracts.

In view of this, it was concluded that the choice of the contractor is the most important part of project planning in non- traditional contracts. If a competent, financially able contractor is awarded the contract, the risk of cost overruns is reduced substantially.
It is recommended that the use of non-traditional contracts be encouraged.

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CHAPTER 1: INTRODUCTION

1.1 Background of the study

The complex nature of construction projects has often made it impossible for the designs shown on drawings, specified and quantified in the bills of quantities to be converted into physical structures without variations. Aje and Jagboro (2003) observed that in any building works, it was a rare occasion that ***variations*** would not occur.

Variations may lead to time and cost overruns in construction projects. Cost overruns may add value to projects by producing a better product, or may add no value and represent wasted money. This study dealt with cost overruns that occur in non- traditional procured contracts.
Mbatha (1986), in his study of performance of government projects, observed that causes of delay and cost overrun are: inefficient technical and economic appraisal, most projects are commenced without carrying out thorough site investigation and market surveyors that are necessary for planning purposes. Cost overruns may arise due to poor estimates by client and project Quantity Surveyor as a result of the project brief being inadequate or using un-updated cost data.

Cost overruns may be as a result of badly written conditions of contract in projects, although standard conditions of contract are widely used circumstances sometimes call for amendments and addendums to take into account all the factors affecting or likely to affect a particular contract. He also included in the list inadequate tender evaluation, excessive variation, disruption and lack of competence by contractors and suppliers as other causes of cost overrun.

In his study Mbatha (1986) did not separate the projects that used traditional methods of procurement and those that had used non traditional methods of procurement. Later Kwakye (1994) undertook a study in this area but the difference with Mbatha (1986), is that he did not restrict his study to government projects only. In his study he observed the causes of delay and cost overrun in contracts as being; the methods of used in cost estimation, standards of work required and project requirements among others. Contractors past experience with clients and his or her advisors influence the estimators pricing method. Differences in quotations prices, purchasing arrangements during procurement and the frequency of purchase, settlement of credit accounts on demand, reliability of suppliers, method statement and construction program were also cited as causes of cost overruns.

Talukhabha (1999) observed, although studies by Mbatha (1986), Mbeche and Mwandali (1996) and Baradyana (1996) identified factors such as subcontractors, weather, materials, underestimation of project time, variations, equipment, incorrect design drawings and slow process in decision making among others, as causes of overruns the significance of each of the causes of cost overrun was not also established. He concluded that the two most significant factors that cause delays are related both to the client and the architect. The client and the architect are key project participants. He further observed that the other significant factors can as well be linked to actions and omissions of the project participants because they are subject to sound project planning and control. In his study he did not also separate nor compare the projects that had been procured using the traditional method and non- traditional methods of procurement.

Mbatha (1986) observed the causes and nature of the variations are, however, an area requiring further research. This is because it is only by knowing the contribution to variations by the various parties concerned i.e. professionals, contractors, and the client that further investigation can be conducted so as to avoid the delays and the cost overruns. All this is in the endeavor to establish the root causes of delay and cost overruns.

Many researchers have shown interest in this area and have attempted to explain the relationships of the various factors involved. Kivaa (2000), has faulted the time estimation method used that are unscientific and resulting to difficulties in estimating time-related project costs such as cost of finance, insurance, water, electricity and telephone, difficulties in assessing and justifying extension of time and difficulties in managing the estimated contract period efficiently to ensure that a construction project is completed on time.

In his works Kivaa (2000), developed a mathematical model for estimating construction period, and hence reduce cost overruns like the ones mentioned above. In his study he did not also separate nor compare the projects that had been procured using the traditional method and non-traditional methods of procurement.

Gichunge (2000) also observed that the J.B.C. conditions of contract for building works had various clauses that allowed for variation these are, clause 2, 4, 6, 11, 12, 21, 22, 23,24, 30(3), 4(b) clause 31and 32. In his works Gichunge (2000) examined the nature of risks and adequacy of risk management in building projects where he developed predictive models of risk

management. Gichunge (2000) further ranked the factors of variation in the Joint Building Council (J.B.C) conditions of contract in terms of frequency of occurrence where extra works was leading with a relative frequency of 73.5%.

Review of literature shows that the causes of cost overruns are known but studies to determine their significance in non- traditional procured contracts has not been determined. Gichunge (2000), suggested further research on the feasibility of non-traditional contracts such as design and build and management contracting in Kenya.

The Joint Building Council (J.B.C) conditions of contract are based on the traditional procured contracts and therefore the study did make any observations on non- traditional contracts but rather suggested some of the non-traditional procured contracts like design and build to be areas of further research. However, this study covered the design and built and other forms of non-traditional contracts.

Kimani (2004) investigated and established that cost and time overruns can be minimized by: Design plans that minimize design changes during the construction stage and adequate finance planning that limits the delay caused by lack of finance and associated finance problems. In his study he did not also separate nor compare the projects that had been procured using the traditional method and non- traditional methods of procurement.

Abwuza (2006) investigated and established that building cost performance is influenced by the Quantity Surveyor perception of the risk importance of cost factors that include, extra work,

design and specification changes coupled with extended or reduced contract period and delay in preparing detailed drawings. Delayed payment, late instructions, financial failure of contracting party and defective materials or work are other risk factors. Differing underground conditions, delays arising from client supplied items, inaccurate quantities and price fluctuations.

The most significant factors influencing project costs are the quantity surveyor perception of the significance of extra work and extended or reduced contract period and importance of delays in preparing detailed drawings. Other factors include design and specification changes, delay in preparing detailed drawings, extended or reduced contract period and late instructions were considered as the main causes of delays. Other factors include, financial failure of contracting party, defective materials or work and differing underground conditions.

Abwuza (2006) concluded that Quantity Surveyors have the correct perception of only 12 out of 20 important factors implying that their cost management strategy is likely to concentrate on mitigating the impact of these factors on project cost. Their perception of the remaining eight factors is likely to result into shocking cost changes of increased risk exposure. He recommended that it was therefore important for the project team to place greater emphasis on all the 20 important risk factors in order to mitigate potential cost overruns in building contracts. The remaining 11 factors may not be important but should not be completely ignored but prudent cost management should place less emphasis on them.

Seboru (2006) also investigated ,and established that road construction delays are caused by exogenous and endogenous factors, exogenous factors include political interference, inflation,

and interest rate, endogenous factors include, design change by engineers and inadequate planning and scheduling, he recommended that an independent body of professionals should be formed to oversee road construction in Kenya.

Mureithi (2006) investigated and established that projects that were carried out using the traditional procurement method perform worse in terms of adherence to programs having a higher percentage time overrun of 56%. This is compared to projects that were carried out using the non-traditional procurement methods which performed better in terms of adherence to program having a lower time overrun of 20%.

The projects that were carried out using the traditional procurement method perform worse in terms of adherence to budgets having a higher percentage time cost overrun of 36%. This is compared to projects that were carried out using the alternative/contemporary procurement methods which performed better in terms of adherence to budget having a lower cost overrun of 20%.

He also established that only 3 out of 18 projects carried out using the traditional procurement method were most suited for that method while the rest should have used non-traditional procurement method. Of the twelve projects that were carried out using non-traditional procurement methods, eleven were found suited to that method while one could have used the traditional procurement method or the non-traditional procurement method as there was a tie of points. It can be deduced therefore that due consideration is not always given to choice of

procurement method that best suits the priorities of the client particularly on the use of procurement method.

Mureithi(2006) study is closely related to this study however we identified a gap in the sense that whereas his study was focused on the performance of traditionally procured building projects in comparison with non- traditional procured ones he did not separate the causes of cost overruns of traditional procured projects with non- traditional.

This study therefore focused on areas of further research suggested by Mureithi (2006) as a continuation of his work and as an effort to build the body of knowledge of this area of study.

1.2 Problem statement.

From the above background and in conclusion, the causes of delay and hence cost overrun can be summarized into four broad categories depending on their nature and mode of occurrence: inadequate design; lack of understanding of project scope and size; poor project management; inaccurate cost estimates.

The causes of delay and cost overruns in projects have been identified and ranked, in terms of their significance in past studies, including project performance comparison between traditional and non- traditionally procured projects, the confirmation of causes of delay and cost overruns specifically for non- traditional contract have never been done. From the preceding discussion, it may be stated that this research is concerned with identifying causes of cost overruns and their significance in non-traditional contracts.

1.3 Objectives of the study

The objectives of the research are:-

To determine the frequency of utilization of the various non- traditional procurement methods in building projects executed in Nairobi.

To identify significant factors that cause cost overruns in non-traditional as compared to traditionally procured construction projects.

To determine the role of professionals and client on cost overrun factors.

To rank the significant factors with respect to contribution to cost overruns.

To derive a strategy that can minimize cost overruns in construction projects.

1.4 Research questions

The research questions which guided the study included;

a) How often are the non-traditional procurement methods used in building projects executed in Nairobi?

b) What are the factors that cause cost overruns in non-traditional procured projects?

c) What is the role of professionals and clients in the cost overruns?

d) How are cost overruns ranked?

e) Which strategies can be used to minimize cost overruns?

1.5 Significance of the study

The study is significant as it proposes the management of cost overruns as an important method of managing projects. By ranking and identifying causes of cost overrun in fast track projects,

players in the construction industry will be able to minimize cost overrun risks in projects that are procured without the traditional bills of quantities.

1.6 Limitations of the study

This study dealt only with variations that cause cost overruns. Time and quality variations were not be considered. Only contracts that do not incorporate the traditional procurement methods were considered. Non- traditional contracts therefore comprise all construction projects that have not been procured using the traditional procurement methods.

1.7 Scope of the study

The study focused on 80 Nairobi building contractors listed by Kenya Association of Buildind and Civil Engineering Contractors and Ministry of Works in the ratio of 5:11. Twenty construction companies were selected randomly from the list of 80. In the second stage each of the 20 companies selected were requested to give a list of projects they have undertaken in the period between January 1st 2000 and December 31st 2007 in Nairobi.

1.8 Conceptual / Theoretical Framework

The theories of project planning and control are derived from the theories of project management which in turn derives its theories from the general management theory. Procurement involves the strategic organizational management of resources in a logical sequence in order to meet the project needs of design, construction and delivery.

Procurement develops the framework that brings together and establishes boundaries of roles, responsibilities and relationships between parties to a construction project and the determination

of the allocation of risks including those related to time, cost and quality. The procurement method chosen therefore determines the allocation of time, cost and quality risks in a construction project.

The main divide of procurement methods available for use in the construction projects is between the traditional procurement method also referred to as the conventional method and the contemporary methods. Contemporary methods are fairly recent compared to the traditional method and their emergence has mainly been driven by the perceived shortcomings of the traditional method in its performance. Contemporary methods also invariably involve higher project integration or are more management oriented.

The traditional method is still the most widely used in procurement of construction projects. The unique characteristic of this category of procurement is the separation of the responsibility for design of the project from that of its construction. In the traditional method project delivery is a sequential process, the design of the project is usually completed before work commences on site and the responsibility for managing the project is divided between the clients consultants and the contractor and therefore little scope for involvement of either of the parties in the other's activities. The design is fully developed at tender stage and clients are able to know their financial commitment before commencing of the construction project, drawings and bills of quantities provide a common basis of tendering and tender evaluation is relatively easy.

The overall period of design and construction, with design being completed before construction tenders are invited, generally requires being longer than is necessary for project integrating and management procurement options.

In non-traditional procurement clients work more closely with contractors than would normally be acceptable in traditional forms where design and construction elements of a project are deliberately divorced. The traditional procurement methods retain the risks of time and cost overruns to the client and non-traditional procurement methods transfers the risks of time and cost overruns to contractors.

The word overrun has two meanings according to oxford advanced learners dictionary, to spread over and occupy a place in great numbers for example " a warehouse overrun by rats" and "to continue beyond or exceed the time allowed or the expected cost for example "a six month construction overrun". The latter is the meaning adopted in this study.

For the purpose of this study, cost overrun is defined as the extra cost incurred to complete the project over and above the estimated budget or contract sum without increasing the scope and quality of the constructed structure.

Time and cost overruns are also referred to as variations. Variation in simple terms can be described as the extent to which a construction project is varied between the time at which the contract is signed and the issuance of the certificate of practical completion.

In a stricter sense variation, as contained in the standard form of the Joint Building Council (J.B.C) conditions of contract for building works clause 30, "is the alteration or modification of

the design, quality or quantity of the works as shown upon the contract drawings and described by or referred to in the contract bills and specification and includes, the addition, omission or substitution of any item of work, the alteration of the kind or standard of any of the materials or goods to be used in the works, the removal from site of any work, materials, or goods brought upon the works by the contractor for the purposes of the works other than work, materials, or goods which are not in accordance with the contract, the issue of instructions by the architect in regard to the expenditure of prime cost and provisional sums included in the contract bills and of prime cost sums which arise as a result of instructions issued in regard to the expenditure of provisional sums. JBC April (1990 edition)

Cost overrun can also be termed as a construction risk. Talukhaba (1999) observed that risk is unwanted negative consequence of an event. The risk management theory therefore forms a basis on which to examine the problems of cost overruns.

Project management may be defined as the overall planning, control and co-ordination of a project from inception to completion aimed at meeting a client's requirement in order that the project will be completed on time within authorized cost and to the required standards.

This research is concerned with identifying causes of cost overrun in non-traditional procured construction projects since a lot of studies have been done on construction projects procured under traditional procurement systems.

This study focused on the following independent variables; The type of procurement; The role of professionals and the project implementers and project participants composition. The dependent variable that the study focused on was cost overruns of non-traditional procured projects.

1.9 Research Hypothesis

The null hypothesis HO, states that there is no relationship between each of the independent variables and the dependent variable. The alternative hypothesis HA states that there is a relationship between the independent and the dependent variable. The F statistic has been used to test the existence or otherwise of a relationship.

1.10 Research Design

The sampling technique used in this study is random sampling to identify the building contractors and projects, to produce the primary data. Secondary data has been obtained from literature review. The test statistic, "F" has been used to test the study hypothesis.

The software that is used to analyze primary quantitative data is SPSS. Data was cleaned and verified before processing and outputs transferred to MS Excel and MS Word. Reporting was made by use of frequencies, graphs and charts.

In conclusion therefore theories related to project planning and control and studies by Abwunza (2006),Seboru (2006), Mureithi (2006), Githaiga (2006) Kimani (2004) Gichunge (2000) Talukhaba (1999), Kwakye (1994), Mbatha (1986) form the foundation and understanding of cost overruns, review of this literature forms our next chapter.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In any construction contract, the cost of the project consists of the costs for labor, materials and the builder's profit and overhead. Before a project begins, the costs are only estimates. That includes price quotes from a contractor. There is risk involved for both the owner and the builder concerning the builder's ability to perform the work for a given actual cost. The differences between types of contracts primarily lie in who takes the risk, who has to pay for cost over runs, and who keeps the savings if the project costs less than the estimate. In a major construction project, some or all of the different types of contracts may be used. There may be one type of contract between the owner and the primary contractor and different types of contracts between the primary contractor and the sub-contractors.

Rosli (2011) observed that today there are several types of variations of project procurement systems being used in the construction industry. They range from the traditional system to the many variations of fast tracking systems such as turnkey, design and build, built operate transfer, management contracting, cost-plus contracting.

Ayodele (2007) observed that, "to stem the tide of cost and time overruns prevalent with the use of Bills of Quantities contract (traditional method) and still obtain high quality jobs, Lump sum, Design and Build and Target cost contracts are recommended, depending on the size of the project.

2.2 Cost Overruns

In Kenya especially where professionals are involved the most utilized contractual procedure is the bills of quantities in conjunction with drawings and the Joint Building Council (J.B.C) Conditions of contract.

The Joint Building Council(J.B.C) conditions of contract allow for variations and hence cost overruns, for example in Clause 22 the Architect is authorized to issue instructions. He is expressly empowered by this clause to issue instructions in regard to any matter. The assumption here is that the instruction shall be for the good of the project and hence the express authority. The instruction to be issued herein could have the effect of either omission or addition to the contract. The process of formalizing the instruction in writing gives it the authenticity and the binding effect of the responsibility on the part of the Architect.

Mbatha (1993) 0bserved that the Quantity Suveyor does no design work, he is considered the specialist in costs and prices. This specialization is mistakenly referred to as cost control when it is only cost monitoring and reporting, whose data may be used for cost control.

In the Joint Building Council (J.B.C) Conditions of contract clause 30 states "the architect may issue instructions requiring a variation and he may sanction in writing any variation made by the contractor otherwise than pursuant to an instruction of the Architect. He is expressly empowered by this clause to issue variations of a net value of not more than 15% of the builders work, any additional variation requires the consent of the employer and the contractor. The clause also

prohibits him from issuing an instruction requiring a variation for additional work exceeding 0.01% of the contract price without the prior approval of the employer unless otherwise communicated by the employer to the architect and to the contractor."

Again the instruction to be issued herein could have the effect of either omission or addition to the contract. However should any part of the works be omitted from the contract and that part is carried out by others, the contractor shall be entitled to reimbursement of the profit he would have made had he carried out the omitted part. Such loss of profit shall be assessed by the quantity surveyor and if an interim certificate is issued after the date of assessment the said amount shall be added to the amount which would otherwise be stated as due in such a certificate.

Clause 35 also allows for variations where the contractor is compensated for variations in customs and exercise charges, tariffs, V.A.T and other taxes and duties imposed by statutory or other authority in the country where the works are being carried out. This clause also allows for changes in the exchange rate, if at any time during the period of the contract the exchange rates shall be varied and this affects the cost to the contractor of imported materials, then the Quantity Surveyor is supposed to asses the net difference in the cost of such materials. Any amount assessed shall be added to or deducted from the contract price, as the case may be. The clause further states that the "prices contained in the contract bills shall be deemed to be based upon the rates of wages and other emoluments and expenses as determined by the Joint Building Council of Kenya and set out in the schedule of basic rates annexed to the contract bills". "Upon Joint Building Council of Kenya determining that any of the said rates of wages or other emoluments

and expenses are decreased or increased, then the contract price shall be increased or decreased by the amount assessed by the quantity surveyor based upon the difference, expressed as a percentage, between the rate set out in the annexed schedule of basic rates and the rate published by the Joint Building Council of Kenya and applied to the quantum of labor incorporated within the amount of work remaining to be executed at the date of publication of such increase or decrease. Gichunge (2000) analyzed various clauses in the said conditions and ranked them in order of their significance to causes of cost overruns.

However, recently other procurement methods like design and build have been utilized by players in the construction industry in Kenya. The prison staff houses in Langata and Industrial area prison for example were procured by the ministry of works through the design and build method. Projects funded by the World Bank like the blood donor centers across the country were procured through the design and build methods. Various individual building projects especially among Kenyans of Asian origin and some indigenous private developers do not utilize the Bills of Quantities all the time.

2.2 .1 Causes of cost overruns

As contained in the standard form of building contract clause (11.2), "variation is envisaged as the modification of the design, quality or quantity of the work as shown upon the contract drawings and described by the contract bills and includes the addition, omission or substitution of any works". Fundamentally variation arises with change of opinion, changes of fact, and previous error or omission and may not necessarily mean a change in cost. However fluctuation refers to the increases or decreases in cost due to legislative or market forces over and above the

quoted price. It should be noted that in most construction contracts provision is normally made for the contractor and employer to enjoy the benefits of increases or decreases in the prices of basic resources arising from inflation or deflation as the case may be. Therefore fluctuation claims are explicitly limited to labor and materials of construction contracts whose completion period exceeds twelve calendar months while variations apply to the alteration in the scope of work.

Talukhabha (1999)observed that variations can be divided into two broad categories. First is the introduction of changes on the physical characteristics of the project i.e. design and specification, and secondly the change of obligations or restrictions imposed by the client. Variations could arise from clients, designers, builders, sub-contractors and suppliers. Specifically they are caused by; inadequate brief, unsuitable design, design inconclusiveness, inadequate pre-contract planning, professional indiscipline of consultants, and non-availability of materials and labour specified for the works, unforeseen conditions, discrepancy between two or more contract documents and client's intentions.

Talukhabha (1999) argued that variations have significant effects on the efficiency of a project and by implication on site productivity and profitability to the contractor. Variations can operate to destroy the best of construction contracts and often leads to loss of financial control of the project. Variations have adverse effects on construction projects in terms of cost and completion period. Variations originate from various sources for example owner due to change in policy by client (owner oriented variation) or Architect, design Engineer as a result of an error in original plans or specification to realise savings or to improve efficiency.(Architect/Engineer Oriented

variation) or Contractor due to discovery of improper co-ordination of plans and specifications. (Contractor Oriented variation).

These variations are driven by the need to either improve the installation, expedite the construction or lower the project cost. Variations also result due to the development of unexpected conditions for example, normal subsurface exploration may fail to reveal some important foundation condition, or the presence of some important variation of sub grade materials which the contractors must precede also, seasonal climatic conditions may be exceptionally severe necessitating special protective or remedial work, or seriously disrupting schedules in such a way as to interfere with normal sequences and develop the desirability of some changes sometimes particular material or equipment supplier may for some reasons unconnected to the project be unable to meet his precise commitments requiring the substitution of some other material or item of equipment, or the modification of some related element. The unexpected situation is by definition impossible to predict.

Smith(1986) suggested a few methods of managing variations. These include; devising appropriate, entirely adequate alternative procedures, with these alternative procedures, variations will involve no change in the monetary value of work, or else the balance of cost of the changed procedure against costs of the originally contracted procedures will produce negligible changes in the total cost. A proper record of variations should be maintained, all the information about their development, and finally negotiation and recording of the supplemental agreement covering those variations.

When variations are due to unexpected project site developments, substantial changes in the contract costs may be necessary. Unexpected economies may be possible, or substantial added costs may be required for the proper accomplishment of the owner's purposes. In such situations a detailed record of variations acquires both legal significance and usually recognized economic importance of the basis for financial obligations which may be of substantial amount. Clough (1986) further observed that a proposal for change order may be initiated at any level, which should be specific information concerning the exact individual who is responsible for the variations and the reasons for the variations. Careful distinction should be made between proposed and approved change orders.

2.2.2 Delay related cost overrun

Most construction contracts are explicit regarding construction time, designating either a completion date or a specific number of calendar days within which work must be finished. In general, completion is related to the structures capability of being utilized for its intended purpose despite small defects to be corrected or minor items not yet accomplished, this comprises substantial completion. When the contract stipulates a completion date, the contract must protect against any delays in getting construction operations underway. If the contract is not promptly executed, a letter of intent may be needed or the contractor may have to inform the owner that an extension of time will be claimed.

Talukhabha (1999)concluded that time overrun blame usually rests on two key parties i.e. the owner or the contractor or both. Carrying out extra work usually has the effect of lengthening the contract period. In this case the contractor is entitled to reimbursement for the extra costs

involved. Variations of omission may disrupt the continuity of work for certain labor and plant. In this case the labor and plant content of the omission should be paid for by the client. Where the contractor is responsible for the delay damages for non-completion are charged to the contractor to compensate the client.

The costs of delays can cause increase in contract price many times over. Some of the factors that cause time overruns and the contractor is entitled to extension of time and hence cost overrun in the Joint Building Council conditions of contract include, late arrival of drawings, details and levels .Opening up work for inspection or testing. Discrepancies between drawing and contract bills. Delays caused by persons employed directly by the client. Unforeseen project delays by fires, accidents equipment breakdown, strikes, late material delivery, difficult site conditions, floods, legal delays among others.

Smith (1986) observed that project scheduling is intended to match the resources of equipment, materials and labor with project work tasks over time. Good scheduling can eliminate problems due to production bottlenecks, facilitate the timely procurement of necessary materials, and otherwise insure the completion of a project as soon as possible.

In contrast, poor scheduling can result in considerable waste as laborers and equipment wait for the availability of needed resources or the completion of preceding tasks. Delays in the completion of an entire project due to poor scheduling can also create havoc for owners who are eager to start using the constructed facilities.

According to Smith(1986) the most widely used scheduling technique is the critical path method (CPM) for scheduling. This method calculates the minimum completion time for a project along with the possible start and finish times for the project activities. The more resources assigned to an activity, the less time it will take to complete the activity, but the cost will be higher.

Project procurement is another cause of cost overrun it is defined as acquiring all the right goods, materials or services at the right quantity and quality for a particular project.
The functions of procurement include purchasing, expenditure and receiving, inspection, shipping and subcontracts.

According to Talukhabha (1999) poor construction project procurement is another cause of cost overrun, convectional project procurement in Kenya is achieved through the traditional system. It is a characteristic of the traditional system that all project implementation activities revolve around the project architect who is expected to manage the design and the construction process of the project on behalf and to the satisfaction of the client.

This is done with the assistance of other professionals such as Engineers and Quantity Surveyors who are all commissioned by the client at a fee to offer their professional services. Together the professionals constitute the design team essentially the system requires that the design process is complete and sufficient information is made available before the Commencement of construction.

The architect receives a brief from the client and proceeds to develop the design. This is followed by the preparation of tendering documents, if the client is satisfied, to enable the tendering process to begin. Contractors are pre-qualified on the basis of experience, work capacity and past performance. Consequently, contracts are awarded mostly on the basis of the lowest bidder.

A standard form of contract is signed between the client and the contractor. The Joint Building Council standard form of contract in use published in April 1999, does not recognize the project managers in the implementation of projects. This has caused various problems to some clients who may have wished to involve project managers in their projects, the revision only managed to rationalize inefficiency in the construction process and transferred more risks inherent in construction to the disadvantaged parties, that is, the client and the contractor(Talukhaba 1999).

Mureithi (2006) observed that the methods, rules and procedures in the traditional system of project procurement are not flexible, inefficient and at the same time do not meet the requirements of mechanism of accountability for the actions and omissions of the parties involved. For example, to employ contemporary project procurement systems such as package deals, management contracting and project management, that may be suitable in certain project situations, can be achieved by enormous resistance. On the other hand, it is surprising that in the history of construction in Kenya, cases of professional negligence are rare when they should be widespread due to the magnitude of negligence problems currently faced in the construction industry. Efficiency and accountability are subjected to trust and integrity of the concerned parties with the hope that they will do their best for the success of the project with the interest of

the client in mind. The professional participants (architects, engineers and quantity surveyors) are supposed to be guided by good conduct and ethics in the performance of their duties, as emphasized in their rules of professional conduct. The philosophy is not sustainable and may no longer work due to the erosion of ethical and moral norms in the fabric of the wider society (Talukhabha 1999).

Kivaa (2000) faulted the time estimation methods used, time estimation methodologies in the construction industry are associated with and therefore experience several problems. The Bar Chart and the Critical Path Model (CPM) assume a static project environment and therefore the time estimate derived is deterministic. The contingency time added to cater for uncertainty is based on subjective judgment. PERT on the other hand attempts to account for the effect of uncertainty by basing the activity time estimate on three estimates using the probability theory.

Tallukabha (1999) observed, construction project delay is widespread phenomenon in Kenya and reflects poor project time management practices. Project delay frustrates the process of development. In addition, scarce funds are tied in unfinished projects, and cause problems of mortgage servicing. Consequently, viable projects are rendered not viable due to lost opportunities occasioned by changing market conditions. Besides, the cost to society and loss of reputation of the parties involved in the concerned projects is immeasurable.

Delays occur in the following ways; delays prior to commencement on site; delays allowable within the contract; delays caused by contractor and subcontractors.

Pre-construction time overruns are also common, according the Chartered Institute of building. The reasons for this include; Firms operating in new areas have to establish fresh contacts with

statutory bodies to obtain all the necessary building permissions; Increasing competitive tender procedures, meaning post tender negotiations and revisions are a common delay factor; Tightening up of procedures by legislature; The effect of planning for longer lead times at the outset by accounting for the functionality of committees.

2.2.3 Financial or economic cost overrun

Financing of construction projects is also another cause of cost overrun, it can be divided into two stages, i.e. Short term funding; Long term funding. Short term funding is paid off on completion of construction or before that date, whereas long term financing is obtained from a mortgage loan that will be repaid for a number of years and is therefore often called permanent financing. Short term financing has many different forms and phases and includes such loans as land purchase loans, land development loans, construction payroll loans, 'gap' financing and the construction loan itself. The choice of source of finance for a project depends on its size and nature.

According to Grebler (1973), large companies undertake to erect high rise buildings and use financing devices like Unsecured notes or debentures, unsecured commercial bank credit, commercial paper, stock warrants, subordinated convertible debentures and issuance of preferred stocks. Some firms do use construction loans in advantageous circumstances.

2.2.4 Cost estimate related cost overruns

Githaiga (2006) observed, a number of cost estimating methods are used to ascertain and possibly project buildings costs at the pre-tender stage. These include the unit method, floor area

method, cube method, approximate quantities, elemental analysis and pricing bills of quantities before tender. Such an estimate merely attempts to forecast that a building of a certain size can be built for certain sum of money. It cannot analyze whether a particular design is going to meet that cost.

2.2.5 Management or administrative related cost overrun

The construction industry in general is highly fragmented with significant negative impacts, perceived low productivity, cost and time overruns conflicts and disputes, and resulting claims and time-consuming litigation. These have been acknowledged as the major causes of performance-related problems facing the industry. The legacy of this high level of fragmentation is that the project delivery process is considered highly inefficient in comparison with other industry sectors. The type of contract awarded usually has a significant bearing to the level of efficiency attained in a construction project.

The various types of contracts include; fixed price-these comprise package deal or fixed-price/lump-sum contracts. Package deals being when the supplier is offering a service in which he is regularly engaged, while lump sum contracts are based on detailed specifications and drawings and variable price.

Mureithi (2006) observed that proliferation of different procurement routes necessities systematic method of selecting the most appropriate procurement route for each particular project. The traditional approach to contracting for construction projects has been design-bid-build, in which design is carried out independently of the construction process. Once the owner

agency approves the design, the project proceeds to the actual construction phase. Under this approach, construction projects are awarded to the qualified bidder with the lowest total price, pay items are established on a unit-price basis, specifications are strictly focused on materials and method, and the role of the owner or agent is to inspect and maintain.

Competitive bidding among contractors controls cost. The traditional lowest-responsive-bidder system is used throughout the country. Most contractors are comfortable with the procedure and understand its risks and rewards and consider it equitable.

Some limitations associated with the design-bid-build contracting method include: The system is slow and does not favor a life cycle cost approach to projects; The associated risks in terms of quality and maintenance are not the responsibility of the contractor; There is little, if any, opportunity for contractor input into design and construction methods, and quality is often an issue of dispute.

Innovative approaches to contracting include, warranty clauses provide an assurance to the contractor will keep to the estimated costs and time: the premise is that warranties motivate the contractor to do a higher quality job than would be done without such assurance of quality by better aligning the incentives and making the contractor responsible for maintenance costs. A warranty clause also can be included in many other forms of innovative contracting, such as design-build.

Lack of timely progress payment, it is customary that, a construction project requires the client to make periodic payments to the contractor during the construction period. Making accurate progress payments is a critical aspect of completion of a project in time. Progress of construction works are often hampered if costs reimbursements are not done periodically. Appropriate funding levels should always be determined at the planning stage of a project so that the contractor could be paid on a regular basis for work done; contract time, according to Thomson, (1981) a change in program almost produces a change in cost. Extension of contract time increases both fixed and variable costs; the effect of late information is usually to pave way for a claim by the contractor for an extension of time and reimbursement of costs associated with the prolongation; Construction costs constitutes only a fraction, though a substantial fraction, of the total project cost. However, it is part of the cost under the control of the construction project manager. The required levels of accuracy of construction cost estimates vary at different stages of project development, ranging from ballpark figures in the early stage to fairly reliable figures for budget control prior to construction. Since design decisions made at the beginning of a project life cycle are more tentative than those made at a later stage, the cost estimates made at the earlier stage are expected to be accurate. Generally, the accuracy of a cost estimate will reflect the information available at the time of estimation.

Construction cost estimates may be viewed from different perspectives because of different institutional requirements. In spite of the many types of cost estimates used at different stages of a project, cost estimates can be classified into three major categories according to their functions. A construction cost estimate serves one of the three basic functions: design, bid and control. For establishing the financing of a project, either a design estimate or a bid estimate is used.

2.2.6 Procurement systems

Rosli (2011) observed that procurement comes from the word procure which literally means "to obtain by care or effort", "to bring about and to acquire". System is about "organized method", approach, technique, process or procedure".

Ayodele (2007) noted project procurement system, otherwise known as project delivery process or contractual procedure is defined as the framework of relationship and procedures within which construction is brought about. It establishes the role and relationship, which make up the project organization and the overall management structure. It also helps to shape overall values and style of the project. Contractual procedure is significant because it determines the efficiency with which the whole process of producing a building from design through construction can be carried out.

Contractual procedures are aimed at establishing an applicable agreement, which will incorporate, among others, the mode of effecting payment. It follows then that it is a concluding but formal agreement with a contractor who has already been selected. Mureithi (2006) described procurement as the process that deals with construction project definition and delivery.

Mbatha (1993) observed that, literature on procurement systems for building provides two philosophies on which the systems are based. Since only similar things should be compared, the systems may be grouped in two categories for analysis and comparison. In one category also termed as "pure management" the client representation is the main objective. In the other the

main objective is to avail contractor's construction managerial, market knowledge and experience early in the project for client's benefits.

Ayodele (2007) listed 12(twelve) options of contractual arrangement as follows: Cost plus percentage contract; Cost plus fixed fee contract; Cost plus fluctuating fee contract; Target cost contract; Bill of quantities contract; Schedule of rates contract; Lump sum contract; Package deal contract; Turnkey contract; Management contracting; Construction management contract; Project management contract.

Mbatha (1993) however argues that as the term building contract refers to the contract between the client and builder in which the project manager is not a party, project management cannot be considered a "type of contract". It fulfills the project management role. Also, a project manager is not a management contractor although a management contractor can be a project manager.

Maira (2008) observed in the United Kingdom in 1984, the percentage usage of bills of quantities contract was 58.73. The rest six methods share 41.27 per cent. In 1985, the bill of quantities percentage usage was 59.07, the other methods fall within 41.71 per cent. In 1989, it was 48.26 per cent while the other methods shared 51.74 per cent. In 1993,it was 40.63 per cent while the rest shared 59.37 per cent.

Maira (2008) further noted in the UK, there has been a systematic shift from the traditional quantity surveying procedures following the emergence of other contracting methods like design and build, partnering through framework agreements, etc, to lump sums and target pricing. In

Kenya, the construction industry is still stuck to the traditional procedures and use bills of quantities (BQs) as one of the key tender documents remains a standard practice. Perhaps, this could be explained by the fact that we have only one standard form of contract document.

According to Masterman (1996) the procurement systems can be classified into three broad categories: Integrated procurement systems; Management oriented procurement systems; Separated and co-operative procurement system.(pure management).

2.3.1 Integrated procurement systems

Masterman (1996) observed that under this category we have the design and build which comprises, package deal, turnkey and build own operate transfer (BOOT) we also have design and manage which comprises of contractor or consultant based management contracting.

Design and build systems of procurement are not new and have been in operation for a long time. Architects/builders were supplying buildings for their clients before architecture and design became separated from the building process. Design and build is a procurement method where one organization is responsible to the client for both design and construction. organizations currently supplying the procurement option of buying a finished building are most generally building contractors. Consultants can also supply the finished building by taking the tasks of design and construction.

The components of the design and build system are, establishing the need to build, establishing the clients requirements, selecting and inviting tenderers to bid, the contractor or contractors preparing their proposals for design, time and cost, evaluation and acceptance of a tender which then becomes a contract, design and construction of the works, the client will need to have in-

house skills or to obtain them in order to, prepare his 'client's or employer's requirements', carry out his responsibilities in the contract or to develop these to a client's or employer's agent'.

2.3.2Variations on design and build

Mastermann (1996) argued that the common variations of design and build are; direct design and build, in this case no competition is obtained in form of tenders, some appraisal of possible competitors may be made and one contractor is chosen. The other variations is, competitive design and build and is the most usual procedure with tenders being obtained from documents defining the project proposal so as to enable several contractors to offer competition in designs and in prices. We also have 'develop and construct' where consultants design the building required to a partial stage, called a 'scope design' and the competitive tenders from contractors are obtained. The contractors thereafter develop and complete the design and then construct the building. One of the advantages of develop and construct is that a contractor's expertise in buildabilty and procurement skills can be used to his and to the client's advantage, bringing economies to both parties.

Smith (1986) observed that the benefit to be gained from this approach is that by carefully choosing contractors who are especially experienced in the type of work envisaged, advantage can be taken of their expertise by allowing them the flexibility to produce their own schemes.

2.3.3 Package deal

The package deal is often used where the contractors competing will use a significant part of their own or another's proprietary building system or they will be constructing variations of a

repetitive theme. In this system, buildings are provided rather than innovative designs. A package dealer may also offer to provide or to find a site, to sell, mortgage or lease his product, to obtain statutory permissions, perhaps at risk to himself or at a charge to the client.

2.3.4 Turnkey

The key referred to symbolizes the clients only apparent required action, in addition to paying money by means of a lease or outright purchase, that is, to 'turn a key' and take up occupation of this product, the building. Speculative, private housing is a prime example of 'turnkey' projects. There is more than a client has to do than turn a key and pay money. A client has to go through a briefing process with a 'package dealer' and also make important decisions in examining and answering the 'why' and the 'how' questions as far as the product is concerned.

2.3.5 Private Finance initiative

The Private Finance Initiative (PFI) is an example of 'turnkey' procurement method. The aim is to maximize the scope for, and use of private finance, since the private sector carries out the development.

2.3.6 Build-Own-Operate-Transfer (BOOT)

BOOT projects are similar in concept to the Private Finance Initiative. The proposed road from Mombasa to Busia (the great Northern Corridor) will operate on this basis. The 'operate' part is achieved by giving the BOOT organization a license to operate the facility for a given period in exchange

2.3.7 Design and manage

According to Mastermann (1996) the common variations of design and manage are, contractor design and manage and consultant design and manage, in the former the contractor employs works contractors as his subcontractors to construct for a fee. In the later the consultant obtains subcontract tenders from works contractors who then each enter into a direct contract with the client. The design and manage system has not been widely used. Selection of organizations to tender will depend on previous expertise in a similar way that some design and build companies may have specialist skills or service particular market sectors.The difference from design and build is that the initial price is not known when commitment to a design and manage organization is made as with the management system, the works contractors are selected and paid prices agreed by the client and the design management organization. Variants of evaluating the design and management fees exist as with pure management. A client needs to know his functional requirements very well and then be prepared to leave the design and management to the appointed contractor or consultant in an area of building that is quite specialized.

2.4.0 Management oriented procurement systems.

Management oriented procurement systems are used where the experience of the contractor is in the management of the project for a fee. In this case the contractor does not bear the risk of inadequate design. There are different types of such systems that are commonly used in the construction industry.

2.4.1 Management contracting

Smith R. (1986) described management contracting as a method of managing a project where the main contractor assumes full responsibility for the organization and carrying out of the work on site. The common variations of management contracting are, managing contracting where the appointed management contractors provide the service of managing for a fee all the works contractors who are to deliver the project by employing them as his subcontractors.

Management contracting has the disadvantage that a management contractor is neither a traditional contractor, who bears the risks, nor a consultant (constructional manger) with equal status with a design team. The other variation is the appointment of a construction management organization that provides the service of managing for a fee all the contractors who are to deliver the project but each of them enters into a contract with the client.

Construction management is a method in which the construction manager, by taking a more active role, can better manage the process. A construction manager, by taking a more active role, can better manage the process. A construction manager could also provide cost control services and even design services, providing then the virtually design and manage procurement. Construction management can be preferred by clients who have the confidence and capability to follow a management path.

2.4.2 Prime cost contracting

The appointed contractor provides the service of managing for a fee all construction work which is then carried out on a 'prime cost' basis, including the employment of subcontractors, to deliver the project. Fee management is not considered as 'pure management' because the contractor does

himself provide a considerable proportion of the labor, material and plant and is often heavily involved in the doing, as well as the managing, of the works. It is considered that this is incompatible with the philosophy of a contractor supplying pure management expertise.

2.5.0 Separated and cooperative procurement system

Separated and cooperative procurement systems are used in non-traditional procured projects where the client wants to transfer the risk of design inadequacy to the contractor. In these systems there are types of procurement used.

2.5.1 Design-Bid-Build.

Mastermann (1996) argued that the traditional method of building where work is designed by a team of architects and engineers and then advertise the plan to solicit bids from construction firms. The winning firm becomes the General Contractor, responsible for overall completion of the project using the firm's own employees, sub-contractors, or a combination of both. The design and construction phases of the project are clear and distinct. A complete set of design documents is finished before the builder becomes involved.

There are several advantages to this process. First of all it has been around for a long time and is well understood. The design documents must be thorough and complete which lessens the chance of misunderstandings. This method should allow plenty of time to consider alternatives and to complete a thorough integrated design that involves all the occupants and design team members. The disadvantages are that this method takes the greatest amount of time to complete

and that the designers and builders can sometimes become antagonists when the builder is unable to understand or even unable to build what has been designed.

Design-Bid-Build is most frequently done using a lump sum bid contract, but guaranteed maximum price is sometimes used. One pitfall to look for is that sometimes builders will intentionally bid low in order to win the project and then hope to make up the loss in profits through change orders.

2.5.2 Lump Sum.

A lump sum, sometimes called stipulated sum, contract is the most basic form of agreement between a supplier of services and a customer. The supplier agrees to provide specified services for a specific price. The receiver agrees to pay the price upon completion of the work or according to a negotiated payment schedule. In developing a lump sum bid, the builder will estimate the costs of labor and materials and add to it a standard amount for overhead and the desired amount of profit.

Most builders will estimate profit and overhead to total about 12-16 percent of the project cost. This amount may be increased based on the builder's assessment of risk. If the actual costs of labor and materials are higher than the builder's estimate, the profit will be reduced. If the actual costs are lower, the builder gets more profit. Either way, the cost to the owner is the same. In practice, however, costs that exceed the estimates may lead to disputes over the scope of work or attempts to substitute less expensive materials for those specified (Mastermann 1996).

2.5.3 Unit Price. In a unit price contract, the work to be performed is broken into various parts, usually by construction trade, and a fixed price is established for each unit of work. For example,

painting is typically done on a square foot basis. Unit price contracts are seldom used for an entire major construction project, but they are frequently used for agreements with sub-contractors. They are also often used for maintenance and repair work. In a unit price contract, like a lump sum contract, the contractor is paid the agreed upon price, regardless of the actual cost to do the work (Mastermann 1996).

2.5.4 Guaranteed Maximum Price. In a guaranteed maximum price (GMP) contract, the contractor estimates the cost just like in a lump sum bid, but profit is limited to a specified amount. In the event that actual costs are lower than the estimates, the owner keeps the savings. In the event costs are higher, the contractor pays the difference and profit is reduced. Sometime, savings are shared between the owner and the contractor as an incentive to keep costs down. As in a lump sum contract, higher than anticipated costs can lead to disputes. The GMP will only apply to the work specified in the cost estimate. Changes, possibly including unforeseen circumstances or additional work which the contractor agrees to perform can result in a final payment that is higher than the GMP.

2.5.5 Cost Plus.

In a cost plus contract the contractor's profit is set at a fixed amount. If actual costs are lower than the estimate, the owner keeps the savings. If actual costs are higher than the estimate, the owner must pay the additional amount. The great advantage of a cost plus contract is that, generally speaking, the project will result in the building that was envisioned, even if costs run high. The builder is less likely to cut corners or argue for less expensive materials because his

profit is not in jeopardy. By the same token, the builder has little incentive to keep the owner's costs down.

2.6.0 Method of selection (procurement) uses and main features

According to Mureithi (2006), there is no one size fits all procurement method for every project.Smith R.(1986) recommended the following procurement methods for various uses.

2.6.1 Orthodox bill of quantities

Suitable for most projects provided all planning and design work has been completed at tender stage .provides the client with good degree of control over financial aspects of the contract.

2.6.2 Bills of approximate quantities

Used mainly for civil engineering works and projects where detailed design work is incomplete at tender stage. This enables the client to make an early start on site.

Rates in the bills are used to value the remeasured work.

2.6.3 Cost reimbursement contracts

Used where the extent and scope of the work cannot be ascertained at tender stage. Contractor is reimbursed with his actual costs plus fee for overheads and profit. This encourages greater co-operation between client and contractor. The pricing of variations does not pose a problem since the cost of all work done is recorded. Careful recording of costs is required, administration work is difficult.

2.6.4 Target cost contract

Used in the same circumstances as above, but introduces incentives for the contractor to minimize costs.

2.6.5 Continuity contracts

Used where the client can take advantage of a contractor already on site in order to save time and money on a second project. Contracts usually entered into on an adhoc basis. Original bill of quantities can be used as a basis for valuing new work.

2.6.6 Serial contracts

Similar to above, but the approximate number and size of similar future contracts are known before hand. The successful contractor for the first project undertakes to carry out the remaining contracts using rates in the original bill of quantities to value the work.

2.6.7 Term contracts

Used for large scale maintenance and repair work. Contract sum is unknown at the time of tender. Competition is based on a schedule of rates. Successful contractor undertakes to carry out all work given to him during a stated period of time the work being measured and valued as it is completed.

2.6.8 Two stage tenders

Used where the client wishes to involve the contactor in the planning and programming of the work. Suitable contractor initially selected on a competitive basis using a schedule of rates which are then used to value the work when final designs are complete.

2.6.9 Design and build

Used where the client wishes to take full advantage of a contractor's skill and expertise in specialized filed. Contractor carries out all design work, prepares his specification and price in addition to the building work itself. Usually gives the client an efficient and speedy service the contractor is working to his own design. rawings and specification used for small works where the cost of preparing a bill of quantities is not justified presents the contractor with the additional task of preparing his own quantities. Terms and conditions of contract should be clearly stated to avoid confusion

2.6.10 Management contracting

Used where the main contractor can use his managerial expertise in the design, planning and administration of the contract. The work is carried out entirely by specialist subcontractors operating under the direction of the main contractor. In conclusion reviewed literature reveals that causes of delay and cost overruns in projects have been identified and ranked in terms of their significance in past studies, including project performance comparing between traditional and alternative methods (fast track contracts).

From the literature review the study found out that cost overruns are caused by incorrect planning process, over dependence of the traditional procurement methods, perception of risk by the Quantity Surveyor and exogenous factors like, politics inflation and rise in interest rates. That there is no one size fits for all procurement method for every project.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter presents the research design and the research methodology. It discusses the issues on how the research was organized, followed by the data types, the data needs, and the organization of the data collection process. The chapter further discusses the data analysis process.

3.2 The Research Design

This study aimed at establishing in non-traditional projects the following; Determine the frequency of utilization of the various procurement methods in building projects execution in Nairobi; Identify significant factors that cause cost overruns in non- traditional contracts as compared to traditionally procured construction projects; Determine the role of professionals and client on cost overrun factors; Rank the significant factors with respect to contribution to cost overruns; Derive a strategy that can minimize cost overruns in construction projects. In the final analysis, the study intended to derive a strategy that can minimize cost overruns in the non-traditional procured construction projects.

3.2.1 Sampling Methods

Mugenda (1999) observed that where time and resources allow, a researcher should take as big a sample as possible .With a large sample, the researcher is confident that if another sample of the same were to be selected, findings from the two samples would be similar to a high degree.

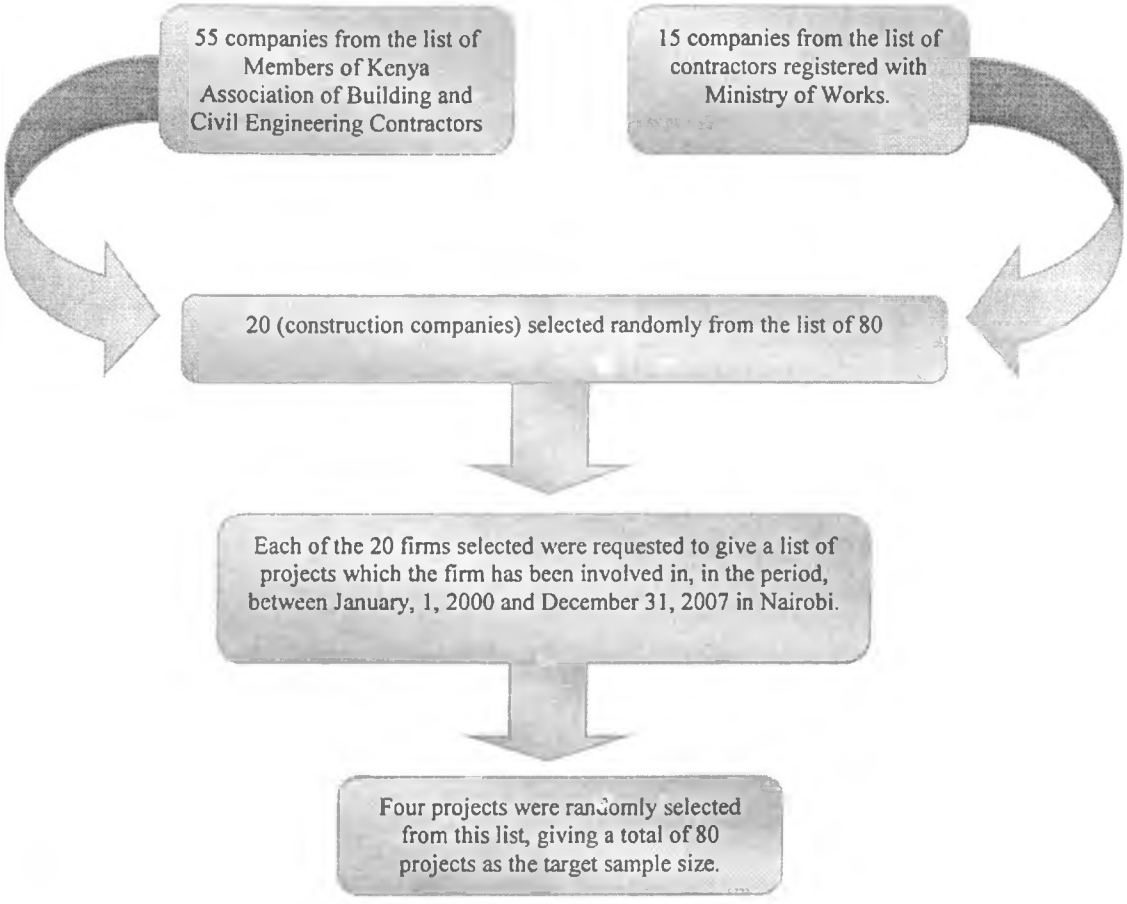
Gichunge (2000) observed that a sample size of less than about 30 cases provides too little certainty to be practical and therefore a target of not less than 80 projects will be considered to be sufficient since it is way above the practical minimum.

The target population in this study was as all the construction projects executed in Nairobi between January, 1, 2000 and December 31, 2007 whose contracts were managed by contractors registered with Ministry of Works and Members of Kenya Association of Building and Civil Engineering Contractors in all categories.

According to Githaiga M, (2006), Nkado (1992) investigated information systems for the building industry with a sample of 29 cases. Ogunlana, et al (1996) investigated the causes of delay in projects in Thailand basing their research on a sample of 12 projects. In his research of investigating into factors that affect accuracy of cost estimates he used a sample of 68 projects.

Kivaa P. (2000) in his research developing a model for estimating construction period used a sample of 75 projects. A sample of 80 construction companies is targeted in this research. The sample will be limited to this size because of budget constraints.

Chart 3.1: Sampling Conceptual Model



Source: Own Survey, 2009

From the chart above the following explanations about the sampling process are indicated.

i. As indicated in chart 3.1 above, the study compiled a list of 80 Nairobi Building contractors from two existing records in a ratio of 5:11 because Kenya Association of Building and Civil Engineering Contractors has a majority and ministry of works has a minority as follows;

ii. 55 from the list of Members of Kenya Association of Building and Civil Engineering Contractors and;

iii. 15 from the list of contractors registered with Ministry of Works.

In the first stage of sampling process, 20 (construction companies) were selected randomly from the list of 80. In the second stage, each of the 20 firms selected were requested to give a list of projects which the firm has been involved in, in the period, between January, 1, 2000 and December 31, 2007 in Nairobi.

From this list, four projects were randomly selected, giving a total of 80 projects as the target sample size. To adequately address the research objectives, the study analyzed the following units of analysis; The cost of the project in terms of the cost differences; The type of procurement; The causes of cost overruns and how the project implementers rank them in the order of their seniority; The project stakeholder composition and what role they play that causes overruns. The objective is analyzable and measurable because this study intends to consider the cause of cost overruns as independent variables and the final cost of the project as the dependent variable.

3.2.2 Research Authorization

The researcher was granted permission to conduct his research by the Department of National Council for Science and Technology in the Ministry of Higher Education, Science and Technology by a letter "Research Authorization" and a Permit.

3.3 Data

3.3.1 Data Types

The types of data for this study relied heavily on the research questions as detailed in chapter one of this report. Two types of data were collected namely secondary and primary data.

Secondary Data

This type of data was fundamental as a precursor to understanding the basic concepts and theories surrounding fast-track construction projects. It helped the researcher to familiarize with the field of fast-track construction in a broader sense. This type of data highlighted what other scholars have written generally about cost overruns in construction industry, how they are contributed to, among other issues. It helped in widening the researchers reasoning with regard to developing the conceptual model and the methodological approach to the study.

Primary Data

Apart from the secondary data, primary type of data was also pursued in this study. Since the study could not rely on desk top review of the literature, issues to do with the cost overruns in fast track projects had not been well documented thus had to be got from primary information. This type of data also helped the researcher through the project managers (who were basically the implementers) to rank the factors responsible for these cost overruns depending on their levels of significance. The roles of professionals and clients had also to be captured through primary data. This type of data too, established the level of influence of the project stakeholders.

3.3.2 Data Collection

Secondary data was collected from the libraries, internet and relevant journal magazines. Primary data was collected through field survey. Research assistants with a background in construction and also with some training on how to research information from project documents were contracted to assist in data collection.

The researcher telephoned the respondents to introduce to them the research study. The research assistants collected the data. The researcher held meetings with the assistants on weekly basis to review progress and to lay strategies for the succeeding weeks.

3.3.3 Data Analysis

The variables selected for the prediction of cost overruns are those that could easily, inexpensively and conveniently be defined and measured at the pre- contract stage of a building project.

As aforementioned, the study analyzed the following variables; The project cost in terms of the cost overruns; The type of procurement; The causes of cost overruns and how the project implementers rank them in the order of their seniority; The project participant's composition and what role they play that causes overruns.

From the variables, the study identified the dependent and independent variables as follows. Since the study was looking at factors that cause variations in the cost of the project, the study's dependent variable was the cost of the project.

All other factors that shaped the behavior of this dependent variable became the independent variables.

The hypothesis testing adopted the Single Sample t-test. This kind of test is used to compare the mean of a sample to a known number (often 0).

It assumes that subjects are randomly drawn from a population and the distribution of the mean being tested is normal.

This test is used to test the hypotheses for a single sample t-test.

H_o: $u = u_0$

H_a: $u <> u_0$

(where u_0 denotes the hypothesized value to which you are comparing a population mean)

For the test statistic;

The test statistic, t, has N-1 degrees of freedom, where N is the number of observations.

Quantitative data from the field was collected and analyzed through statistical methods(discussed below).

To show the level of utilization of various contracts in building projects, the data was expressed as a percentage using the following formula;

Percentage of frequency of utilization = no of times the contract has been used x 100

Total no. of contracts used.

To determine the type of fast track with the most significant cost overruns, the data was expressed as a percentage using the following formula;

Percentage of cost overrun = Final cost- original contract sum x 100

Original contract sum

To identify significant factors that cause cost overruns in fast track contracts, project managers were asked to rank the significant factors that contributed to cost overruns in the fast track contracts they managed, the ranking was calculated using the following formula;

Total Ranking = the no. of times the factor has been mentioned as the major cause of cost overrun(rank 1) no. of times rank 1 divide by the no. of rankings(in this case 4)

Overall rank was obtained by taking the factor with the greatest rank.

To determine the influence of various professionals used to deliver a construction project, the ranking of various participants of team were ranked 1 to 4, where 1 represents the team member with the most influence and 4 to represent the least influential. The most influential participant was obtained by using the following formula.

Total ranking for a professional = total ranking under rank1+total ranking under rank2+total ranking under rank3+ total ranking under rank4.

The specific- role of influence of each member was obtained by picking the highest count for each role.

The relationship between contract type and project team composition of each member was obtained using the following formula

% within procurement type= count for team member x100 divide by total count.

The relationship between contract type and roles of the team members was obtained using the following formula

% within procurement type= count for each type of contract x100 divide by total count.

CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

In summary this chapter analyses the information found from the data and finds out to what extent the data and information obtained relates to research objectives outlined below; Determine the frequency of utilization of the various procedures in building projects execution in Nairobi; Determine the type of non-traditional contracts with the most cost overruns; Rank the significant factors with respect to contribution to cost overruns; Asses the influence of professionals and client on cost overrun factors.

Each of the 20 firms selected were requested to give a list of four projects which they had been involved in, in the period, between January, 1, 2000 and December 31, 2007 in Nairobi.

As indicated in table 4.1 below, the researcher got 20 building and construction companies although due to unforeseen circumstances, only 18 companies (90%) managed to avail time for the interview, out of the 18 companies, the study expected that each company would give four projects. Some companies however produced less-than-four fast-track projects giving the study a total of 70 fast-track projects on which the analysis was based. In some projects, the interviewees never revealed the amount of cost of the projects. The study obtained cost data for only 58 projects. This was an acceptable number since using the base of 18 companies, which constituted 97.3%, also using the hypothetical base of 80 projects, this would constitute 87.5% which is still acceptable.

Table 4.1: The number of studied projects

The Expected Sample	The Number that yielded to Interview	Number of projects studied	Number of project that managers revealed their costs
20	18 (90%)	70 (87.5%) using 80 projects as the base	58 (72.5%) using 80 projects as the base

Source: Own Survey, 2009

4.1 Frequency of Utilization of Various Procedures

In an effort to determine the level of utilization of the various contracts in building projects execution in Nairobi, the study found out that among the most favored procurement types in non-traditional procured construction projects are, Cost Reimbursement leads with a 54.2%, followed by Term Contracts (41.7%). Bill of Approximate Quantities came a distant third with 4.1% of the respondents being affirmative for using it in the projects they have handled before. See table 4.2 below.

Table 4.2: Procurement types used in non-traditional procured Projects

Procurement type	*Responses*	
	N	*Percent*
Bills of Approximate Quantities	*2*	*4.1%*
Cost Reimbursement	*26*	*54.2%*
Term Contracts	*20*	*41.7%*
Total	*48*	*100.0%*

Source: Own Survey, 2009

The study went further to analyze type of buildings favoring what type of procurement. Table 4.3 illustrates this by cross-tabulating the two variables.

Table 4.3: Cross Tabulation between type of building and contract type

Type of building	*Statistics*	*contract Type*			*Total*
		Bills of Approximate Quantities	*Cost Reimbursement*	*Term Contracts*	
Residential	*Number*	*2*	*12*	*5*	*19*
	% within type of building	*10.5%*	*63.2%*	*26.3%*	
Commercial	*Number*	*0*	*6*	*8*	*14*
	% within type of building	*.0%*	*42.9%*	*57.1%*	
Office block	*Number*	*0*	*5*	*6*	*11*
	% within type of building	*.0%*	*45.5%*	*54.5%*	
Store building	*Number*	*0*	*1*	*0*	*1*
	% within type of building	*.0%*	*100.0%*	*.0%*	
Data centre/ archive	*Number*	*0*	*1*	*0*	*1*
	% within type of building	*.0%*	*100.0%*	*.0%*	
Education building	*Number*	*0*	*1*	*1*	*2*
	% within type of building	*.0%*	*50.0%*	*50.0%*	
Total	*Number*	*2*	*26*	*20*	*48*

Source: Own Survey, 2009

The study revealed that in terms of time extension in months, on average, non-traditional are given an extension of 8.063492 months. Further the findings went ahead to establish the relationship between the percentage change in cost of a non-traditional procured project and the type of procurement. See table 4.4 below

Table 4.4: Relationship between percentage change in cost and the type of contract

% change	Statistics	Contract Type			Total
		Bills of approximate quantities contract	Cost Reimbursement contract	Term Contracts	
8.00	Number	0	2	1	3
	% within $change	.0%	66.7%	33.3%	
10.00	Number	0	2	0	2
	% within $change	.0%	100.0%	.0%	
11.00	Number	0	1	2	3
	% within $change	.0%	33.3%	66.7%	
13.00	Number	0	2	0	2
	% within $change	.0%	100.0%	.0%	
16.00	Number	0	2	0	2
	% within $change	.0%	100.0%	.0%	
20.00	Number	0	3	2	5
	% within $change	.0%	60.0%	40.0%	
25.00	Number	0	3	2	5
	% within $change	.0%	60.0%	40.0%	
28.00	Number	0	1	0	1
	% within $change	.0%	100.0%	.0%	
30.00	Number	0	1	3	4
	% within $change	.0%	25.0%	75.0%	
33.00	Number	0	2	2	4
	% within $change	.0%	50.0%	50.0%	
37.00	Number	1	0	0	1
	% within $change	100.0%	.0%	.0%	
41.00	Number	0	1	0	1
	% within $change	.0%	100.0%	.0%	
50.00	Number	1	2	3	6
	% within $change	16.7%	33.3%	50.0%	
53.00	Number	0	1	0	1
	% within $change	.0%	100.0%	.0%	
70.00	Number	0	0	1	1
	% within $change	.0%	.0%	100.0%	
100.00	Number	0	1	2	3
	% within $change	.0%	33.3%	66.7%	
150.00	Number	0	0	1	1
	% within $change	.0%	.0%	100.0%	
250.00	Number	0	0	1	1
	% within $change	.0%	.0%	100.0%	
Total	Number	2	24	20	46

Source: Own Survey, 2009

We observed that the bills of approximate quantities have the least cost variation followed by cost reimbursement and term contraçts in that order.

4.2 Causes of Cost Over-runs

In a bid to identify significant factors that cause cost overruns in fast track contract construction projects as questioned by objective two of this study, it was established that cost overruns in fast track projects are varied as shown in table 4.5 below;

Table 4.5: Causes of Cost Overruns in Non-Traditional Projects

Factors	*Percent*
Variation in the cost of construction materials	18.0%
Changes in the design of the building	13.0%
Changes in finishes by the client	7.0%
Contractor ran out of money to run the project for sometime	7.0%
Hiring of other different tools and construction materials (crane) during the construction not anticipated	7.0%
Contractor involved in unmeasured work not anticipated	4.0%
Under-measurement of the quantity of materials at the time of preparation of bills of quantity	4.0%
Under quotation of the cost of construction materials by the quantity surveyor	4.0%
Increase in cost of labor during the construction period	4.0%
Contractor Used lower quality materials which were revised	4.0%
Client stopped the supply of construction materials on the site has had been agreed	3.0%
structural engineer refuted the type of materials used because of their low quality	3.0%
The client stopped to provide money for the running of the project	3.0%
Increase in cost of transportation not anticipated	3.0%
Poor management by the contractor themselves who involved in the works abandoning the project	3.0%
Failure to honor payment certificates by the client	3.0%
Others[1]	10%
Total	100%

Source: Own Survey, 2009

[1] The others are as follows;

- Site condition – excavation to construct the sur-structure become expensive 1.0%
- Increase in the scope of work in terms of vertical expansion 1.0%
- Increase in scope of work in terms of horizontal expansion 1.0%
- Importation of construction materials that was not anticipated 1.0%
- Contractor stopped the project as more materials acquired by the client 1.0%
- Contractor involved sub-contractor who had poor management skills 1.0%
- Nature of the projects-state house has a lot of security concerns and speed of constructing depend on the security 1.0%
- Flow of information and details needed from the architects, structural engineer or any other consultant take a lot of time 1.0%
- Delay and congestion in the supply of the construction from the manufacturers make it difficult to complete in time 2.0%

4.3 Significant Factors Contributing to Cost Overruns

In the objective 4 of the study, the project managers were asked to rank the significant factors that contribute to cost overruns in the non-traditional procured projects that they had managed. As detailed in the table 4.6 below, variation in the cost of construction materials was ranked number one, changes in the design of the building ranked two, while in rank three were three causes – these were number changes in finishes by the client, contractor running out of money to run the project for some time and hiring of other different tools and construction materials (crane) during the construction not anticipated.

Table 4.6 - A: Ranking of Causes of Cost Overruns in Non-Traditional Projects

Causes of Cost Overruns in Fast Track Project	*Statistics*	*rank*				*Total*	*Overall Rank*
		1	*2*	*3*	*4*		
Variation in the cost of construction materials	*Number*	*72*	*28*	*4*	*0*	*18*	*1*
Changes in the design of the building	*Number*	*52*	*22*	*3*	*0*	*13*	*2*
Changes in finishes by the client	*Number*	*26*	*15*	*3*	*1*	*7*	*3*
Contractor ran out of money to run the project for sometime	*Number*	*26*	*9*	*1*	*1*	*7*	*3*
Hiring of other different tools and construction materials (crane) during the construction not anticipated	*Number*	*28*	*5*	*1*	*0*	*7*	*3*
Under quotation of the cost of construction materials by the quantity surveyor	*Number*	*16*	*12*	*6*	*0*	*4*	*6*
Contractor involved in unmeasured work not anticipated	*Number*	*16*	*6*	*0*	*0*	*4*	*6*
Increase in cost of labor during the construction period	*Number*	*16*	*6*	*2*	*0*	*4*	*6*
Under-measurement of the quantity of materials at the time of preparation of bills of quantity	*Number*	*14*	*10*	*1*	*1*	*4*	*6*
Contractor Used lower quality materials which were revised	*Number*	*14*	*4*	*1*	*1*	*4*	*6*
Increase in cost of transportation not anticipated	*Number*	*12*	*7*	*3*	*0*	*3*	*11*
structural engineer refuted the type of materials used because of their low quality	*Number*	*12*	*7*	*0*	*0*	*3*	*11*
Poor management by the contractor themselves who involved in the works abandoning the project	*Number*	*12*	*5*	*1*	*0*	*3*	*11*

The client stopped to provide money for the running of the project	*Number*	*12*	*5*	*1*	*0*	*3*	*11*
Client stopped the supply of construction materials on the site has had been agreed	*Number*	*12*	*3*	*0*	*0*	*3*	*11*
Failure to honor payment certificates by the client	*Number*	*10*	*3*	*1*	*1*	*3*	*11*
Delay and congestion in the supply of the construction from the manufacturers make it difficult to complete in time	*Number*	*8*	*0*	*0*	*0*	*2*	*17*
Nature of the projects-state house has a lot of security concerns and speed of constructing depend on the security	*Number*	*4*	*3*	*2*	*0*	*1*	*18*
Importation of construction materials that was not anticipated	*Number*	*4*	*3*	*0*	*0*	*1*	*18*
Site condition-excavation to construct the sur-structure become expensive	*Number*	*4*	*2*	*0*	*0*	*1*	*18*
Increase in the scope of work in terms of vertical expansion	*Number*	*4*	*2*	*0*	*0*	*1*	*18*
Increase in scope of work in terms of horizontal expansion	*Number*	*4*	*2*	*0*	*0*	*1*	*18*
Contractor stopped the project as more materials acquired by the client	*Number*	*4*	*1*	*0*	*0*	*1*	*18*
Contractor involved sub-contractor who had poor management skills	*Number*	*4*	*1*	*0*	*0*	*1*	*18*
Flow of information and details needed from the architects, structural engineer or any other consultant take a lot of time	*Number*	*4*	*0*	*0*	*0*	*1*	*18*
Total	*Number*	*70*	*25*	*4*	*1*	*18*	

Source: Own Survey, 2009

As aforementioned the causes of cost overruns were ranked with the help of the project managers and implementers. To fairly understand the table above, lets us use the example of

Table 4.6 – B: Explanation for table 4.6 - A

Causes of Cost Overruns in non-traditional Project	*Statistics*	*rank*				*Total*	*Overall Rank*
		1	*2*	*3*	*4*		
Variation in the cost of construction materials	*Number*	*72*	*28*	*4*	*0*	*18*	*1*

Source: Own Survey, 2009

In the table above, out of the total 18 companies visited, variation in the cost of construction materials was mentioned 72 times as rank one, was mentioned 28 times as rank two, was mentioned 4 times as rank three and was mentioned 0 times as rank four.

After weighting, by using rank one, this variable scored 18 rounding off to the nearest tens (at no decimal place). This earned this variable rank 1 overall as a cause of cost-overruns in fast track projects.

The same explanation is applicable to the rest of the variables.

4.4 Influence of Professionals and Clients

Various professionals are used to deliver a construction product, the design time should ideally be composed of the following professionals in, Project Manager, Architect, Quantity Surveyor, Civil Engineer, Structural Engineer, Mechanical Engineer, Electrical Engineer, Interior Designer and Landscape Architect, in this study the assumption is that the more the number of professionals involved the better the project management.

The study, in its endeavors to establish level of influence of professionals and client on cost overrun, it was found out that in cost overruns the following persons compose the team.

i. Architecture

ii. Quantity Surveyor

iii. Contractor

iv. Client

v. Structural Engineer

vi. Clerk of Works

It was further established that for each one of the participant, there are varying levels of influence depending on what role the participant was playing, although they do conservatively play their traditional roles.

The tables that follow show the level of influence of each of the participant as highlighted above. Through ranking, table 4.7 shows that in the whole team, the contractor has much more say, followed by the client, QS, Architect, Structural Engineer and Clerk of Works in that order.

Table 4.7: Ranking of the Team Members

Ranking	*Number*	*Architect*		*QS*		*Contractor*		*Client*		*S/Engineer*		*Clerks of Works*		*Total*	
1	*Number*	*31*	*9.28%*	*77*	*23.05%*	*115*	*34.43%*	*87*	*26.05%*	*22*	*6.59%*	*2*	*0.60%*	*334*	*100%*
			44.29%		*70%*		*67.65%*		*54.375%*		*39.29%*		*33.33%*		
2	*Number*	*25*	*13.59%*	*28*	*15.22%*	*50*	*27.17%*	*59*	*32.07%*	*20*	*10.87%*	*2*	*1.20%*	*184*	*100%*
			35.71%		*25.45%*		*29.41%*		*36.875%*		*35.71%*		*33.33%*		
3	*Number*	*13*	*27.66%*	*4*	*8.51%*	*4*	*8.51%*	*12*	*25.53%*	*13*	*27.66%*	*1*	*2.13%*	*47*	*100%*
			18.57%		*3.64%*		*2.35%*		*7.5%*		*23.21%*		*16.67%*		
4	*Number*	*1*	*14.29%*	*1*	*14.29%*	*1*	*14.29%*	*2*	*28.57%*	*1*	*14.29%*	*1*	*14.29%*	*7*	*100%*
			1.43%		*0.91%*		*0.59%*		*1.25%*		*1.79%*		*16.67%*		
Total		*70*	*100%*	*110*	*100%*	*170*	*100%*	*160*	*100%*	*56*	*100%*	*6*	*100%*		

Source: Own Survey, 2009

The study went ahead to look at the different kinds of roles that the team members play in the fast track projects. Each role was cross-tabulated with the project team and the results were as detailed in the table 4.8 below.

Table 4.8: Specific-Role Influence of Project Team Members

Roles	Count	Project Team						Total
		Architect	QS	Contractor	Client	S/ Engineer	Clerk of Works	
Changed the design of the building and included items not anticipated	Number	17	7	11	27	13	0	75
	% influence	22.67	9.33	14.67	36	17.33	0	100
Under-measured the quantity of materials	Number	5	26	29	16	3	2	81
	% influence	6.17	32.10	35.80	19.75	3.70	2.47	100
Introduced unmeasured works	Number	1	10	14	5	0	0	30
	% influence	3.33	33.33	46.67	16.67	0	0	100
Changed the materials that were supposed to be used for the finishes and introduced different ones which are costly	Number	4	6	13	14	0	0	37
	% influence	10.81	16.23	35.14	37.84	0	0	100
Failure to anticipate and include the cost of excavating the site	Number	2	2	2	2	1	1	13
	% influence	15.38	15.38	15.38	15.38	7.69	7.69	100
Stopped to work so as construction materials to be supplied	Number	2	0	8	7	0	0	17
	% influence	11.76	0	47.06	41.18	0	0	100
Stopped to supply construction materials	Number	1	1	4	5	1	0	12
	% influence	8.33	8.33	33.33	41.67	8.33	0	100
Involved in other projects and ran out of money to operate the project	Number	1	12	26	12	0	0	51
	% influence	1.96	23.53	50.98	23.53	0	0	100
Supply of construction materials in bits/small quantities	Number	2	3	3	6	3	2	19
	% influence	10.53	15.79	15.79	31.58	15.79	10.53	100
Advised on the utilization of high correct quality construction materials	Number	0	2	3	5	1	0	11
	% influence	0	18.18	27.27	45.45	9.09	0	100
Hiring of sub-contractor to manage the project who has poor management skills	Number	0	0	2	1	0	0	3

	% influence	0	0	66.67	33.33	0	0	100
Dishonesty/corruption leaving the project and involving in other projects	Number	0	8	9	3	0	0	20
	% influence	0	40	45	15	0	0	100
Failed to pay the contractor as had been agreed	Number	5	9	14	14	4	0	46
	% influence	10.87	19.57	30.43	30.43	8.69	0	100
Failure to anticipate the cost of hiring tools and machine	Number	1	9	11	8	0	0	29
	% influence	3.45	31.03	37.93	27.59	0	0	100
Hired the construction tools and machine	Number	0	7	10	3	0	0	20
	% influence	0	35	50	15	0	0	100
Use of wrong materials by the contractor	Number	0	2	4	0	0	0	6
	% influence	0	33.33	66.67	0	0	0	100
Failure to provide for contingency	Number	0	3	5	2	0	0	10
	% influence	0	30	50	20	0	0	100
Delay in giving exact details required by the contractor	Number	20	0	0	15	20	0	55
	% influence	36.36	0	0	27.27	36.36	0	100

Source: Own Survey, 2009

It was established that the architect has the most influence in changing of design, the contractor in under-measured quantity of materials and introduction of under-measured work followed by the Quantity Surveyor. The client was most responsible for stoppage of supply of materials and introduction of high quality materials the rest of the team members had less significant influence in every role.

The study further looked at the relationship between the team composition and the favored procurement type. The results are shown in the table 4.9 below.

Table 4.9: Relationship between contract type and Project team Composition

Contract Type	*Number*	*Project Team*				*Total*
		Architect	*QS*	*Contractor*	*Client*	
Bills of Approximate Quantities	*count*	*2*	*0*	*6*	*6*	*14*
	% within procurement type	*14.29%*	*0.00%*	*42.86%*	*42.86%*	*100*
Cost reimbursement	*Count*	*6*	*35*	*54*	*21*	*116*
	% within $procurement type	*5.17%*	*30.17%*	*46.55%*	*18.10%*	*100*
Term contracts	*Count*	*0*	*33*	*48*	*17*	*98*
	% within $procurement type	*0.00%*	*33.67%*	*48.98%*	*17.35%*	*100*

Source: Own Survey, 2009

It is given that in fast track projects, the contractor plays the biggest role in terms of project management and execution. However the study also revealed that among the other project team members (i.e. the Architect, QS and Client), QS's prefer Cost-reimbursement and Term Contracts to Bills of Approximate Quantities as a procurement type of method, although they favor term Contracts above the rest.

Architects prefers Bills of Approximate Quantities to the rest same as clients.

The study also looked at the type of procurement used in fast track projects and the probable roles that would result in cost overruns.

The findings were as shown below in table 4.10.

Table 4.10: Relationship between the type of contract and roles of the team members

Roles		Procurement			Total
		Bills of Approximate Quantities	Cost Reimbursement	Term Contracts	
Changed the design of the building and included items not anticipated	No.	2	11	3	16
	%	12.5	68.75	18.75	100
Under-measured the quantity of materials	No.	0	26	22	48
	%	0	54.17	45.83	100
Introduced unmeasured works	No.	0	8	8	16
	%	0	50	50	100
Changed the materials that were supposed to be used for the finishes and introduced different ones which are costly	No.	4	8	4	16
	%	25	50	25	100
Stopped to work so as construction materials to be supplied	No.	4	4	0	8
	%	50	50	0	100
Stopped to supply construction materials	No.	2	2	0	4
	%	50	50	0	100
Involved in other projects and ran out of money to operate the project	No.	2	19	15	36
	%	5.56	52.78	41.66	100
Advised on the utilization of high correct quality construction materials	No.	0	1	3	4
	%	0	25	75	100
Dishonesty/corruption leaving the project and involving in other projects	No.	0	11	9	20
	%	0	55	45	100
Failed to pay the contractor as had been agreed	No.	0	9	11	20
	%	0	45	55	100

Failure to anticipate the cost of hiring tools and machine	*No.*	*0*	*6*	*10*	*16*
	%	*0*	*37.5*	*62.5*	*100*
Hired the construction tools and machine	*No.*	*0*	*5*	*11*	*16*
	%	*0*	*31.25*	*68.75*	*100*
Use of wrong materials by the contractor	*No.*	*0*	*2*	*2*	*4*
	%	*0*	*50*	*50*	*100*
Failure to provide for contingency	*No.*	*0*	*4*	*4*	*8*
	%	*0*	*50*	*50*	*100*

Source: Own Survey, 2009

The study revealed that different type of procurement methods are subject to different types of stakeholder influences. For instance Cost reimbursement is prone to design change (68.75%) compared to the other two methods of procurements (where Bills of Approximate Quantities (12.5%) while Term Contracts had 18.75%. this is different in other roles played by team member. For example hiring of construction tools and machine is more pronounced in Term contracts with 68.75% as compared to cost re-imbursement (31.25%). Bills of Approximate Quantities do not get affected by this role.

4.5 Hypothesis Testing

To test the hypothesis, the study adopted Single Sample t-test. This kind of test is used to compare the mean of a sample to a known number (often 0).

It assumes that subjects are randomly drawn from a population and the distribution of the mean being tested is normal.

This test is used to test the hypotheses for a single sample t-test are like this study.

H_o: $u = u_0$

H_a: $u <> u_0$

(where u_0 denotes the hypothesized value to which you are comparing a population mean)

For the test statistic;

The test statistic, t, has N-1 degrees of freedom, where N is the number of observations.

Interpretation of the results of the t-test;

If the p-value associated with the t-test is small (usually set at $p < 0.05$), there is evidence to reject the null hypothesis in favor of the alternative. In other words, there is evidence that the mean is significantly different than the hypothesized value. If the p-value associated with the t-test is not small ($p > 0.05$), there is not enough evidence to reject the null hypothesis, and you conclude that there is evidence that the mean is not different from the hypothesized value.

The hypothesis testing in this study is as shown in table 4.11 below;

Table 4.12: One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
	Lower	Upper	Lower	Upper	Lower	Upper
% change	3.005	18	.008	46.20931	13.6079	78.8107

Source: Own Survey, 2009

From the findings,

The value of t equals 3.005

With a degrees of freedom of 18

This mean the value of p equals 0.001. Therefore since the value of $p < 0.05$, there is evidence to reject the null hypothesis in favor of the alternative.

The study concludes that there is a relationship between the independent and the dependent variable.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

The findings that emerged show that non- traditional procured projects are not frequently used and only bills of Approximate Quantities, cost reimbursement and term contracts methods of procurement had been used in a few projects.

It was observed that the major causes of cost overruns in non- traditional contracts are, variation in the cost of building materials, changes in the design of the building, changes in finishes by the client, contractor running out of money to run the project for sometime, hiring of extra tools during construction not anticipated, under estimation of the cost of construction by the Quantity Surveyor (in that order of merit).

The study also observed that influences by the contractor, client, quantity surveyor, architect, structural engineer and clerk of works in that order have the greatest influence on cost overruns among the project implementation team in non- traditional contracts.

5.2 Recommendations

In view of this, it is recommended that the choice of the contractor is the most important part of project planning in non- traditional contracts. If a competent, financially able contractor is awarded the contract, the risk of cost overruns is reduced substantially.

5.3 Areas for further Research.

The study has not analyzed the significance levels of the factors causing cost overruns in fast track projects using multiple regression analysis; this can be an area of further research. Many populations of non- traditional contracts projects are expected to be available in the near future.

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Appendix1:
QUESTIONNAIRE

Code.....

Identifying Critical Variables of Cost Overruns and their Significance in Fast-track Contracts

Candidate
Jack W. Waihenya

Contact Person (Respondent)	*Contact Address (Telephone)*	*Name of Firm*

Study Objectives
This study is intended to identify critical variables of cost overruns and their significance in fast-track contracts. It has the following sub-objectives;

i. Determine the level of utilization of the various procedures in building projects execution in Nairobi.
ii. Identify significant factors that cause cost overruns in fast track contract construction projects.
iii. Asses the influence of professionals and client on cost overrun factors.
iv. Rank the significant factors with respect to contribution to cost overruns.
v. Derive a strategy that can minimize cost overruns in construction projects.

Informed Consent
As a good gesture to research ethics, I find it prudent that I ask for your consent. Consequently I am therefore bound by the following;

a. Your responses will be treated with **CONFIDENTIALITY**
b. The study **DOES NOT** intend to associate any of the responses in this questionnaire with you or your associates or your firm.
c. **ANY** divulgence if so occur, will be my responsibility

By the above, will you accept to respond to the questions in this questionnaire?
01 Yes 02 No

Kindly provide me with a list of construction projects executed in Nairobi between January, 1, 2000 and December31, 2007.

Section A

Q1. To which association is your firm registered with?

01 Ministry of Works

02 Kenya Association of Building and Civil Engineering Contractors

Q2. When was it registered? .....

SECTION B: ***The level of utilization of the various procedures in building projects execution***

Q3.

Project	*Project (Name)*	*Project Time*				*Type of building*
		Tender opening	*Extension of time*	*Possession of site by main contractor*	*Practical completion*	
1						
2						
3						
4						

Q4

Project	*Cost of the project (in Kshs.)*		*Type of contract signed*
	Contract sum	*Final account sum*	
1			
2			
3			
4			

Section C: ***Significant factors that cause cost overruns in fast track contract construction projects.***

Project	*Causes of cost-overrun (list)*	*Rank*
1		
2.		
3.		

4.		

Section D: ***Influence of professionals and client on cost overrun factors.***

PROJECT STAKEHOLDERS			
Project	*Project Team Member*	*Rank in terms of influence*	*Role(s)they played that must have contributed to the overruns*
1.			
2.			

3.			

4.			

Section D: Coping Strategies

What would you advise as your favored strategies that can be used to minimize cost overruns in construction projects?

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Thank you for sparing your time for this study.