

**INFLUENCE OF PROCUREMENT PROCEDURES ON CONSTRUCTION
PROJECT PERFORMANCE: A CASE OF POWER PLANT CONSTRUCTION
AT KENYA PETROLEUM REFINERIES LIMITED, MOMBASA.**

BY

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**A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FILFILLMENT
OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER
OF ARTS IN PROJECT PLANNING AND MANAGEMENT OF THE
UNIVERSITY OF NAIROBI**

2013

DECLARATION

I hereby declare that this research project report is the result of my own original work and that no part has been presented for another dissertation in this university or elsewhere for the purpose of examination or otherwise.

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DEDICATION

To my wife Millicent Achieng, my son Randy Omondi and my daughters Alice Joyrose Awuor and Jael Atieno, who through their encouragement, gave me the strength to keep the candle burning during my weakest moments

ACKNOWLEDGEMENT

My appreciations go to the entire Fraternity of University of Nairobi for the favorable learning environment that has enabled to refine and increase my knowledge in Project Planning and Management.

I should not forget to thank my supervisor, Dr. Moses Otieno for the support he gave me to write this research project report. Without him, this report could not be complete.

I would like to offer special thanks to Essar Power Eastafrica Kenya, the company which help us with Construction manager Mr. Sharkar, who has been very supportive and uplifting throughout the writing of this report.

Thanks to Mr. Oscar Ngaiza Large Project Manager of Kenya Petroleum Refineries Limited, for the help he gave on the Power Plant Project. Thanks also go to my colleagues who worked with me in this power plant project.

Some special thanks also go to the all class of Master of Art in Project Planning and Management, October, 2011, who we have been sharing all the Information together as a class.

Thanks to my Wife Ms. Millicent Achieng, who has been keeping my spirits up throughout this research project report writing.

Finally, I would like to thank my son Randy, my daughters Joyrose and Jael for the support they gave me and who wanted to see their names in print, without their support, I could not have completed this report in time.

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ACRONYMS AND ABBREVIATIONS

DB	Design and Build
GDP	Gross Domestic Product
JRM	Joint Risk Management
KPRL	Kenya Petroleum Refineries Limited
PPDA	Public Procurement and Disposal Act
OECD-DAC	Organisation for Economic Cooperation and Development / Development Assistance Committee.

ABSTRACT

Purpose – Procurement systems are vital in ensuring the successful implementation of a construction project, precisely executed for all phases of any particular project. Therefore, this research project aimed to investigate, the influence of procurement procedure on construction project performance. The problem of procurement method adopted in Kenyan construction industry have raises serious concern to the project stakeholders and the construction industry as a whole. The aim of the study is to explore the influence of procurement procedures on construction project in Mombasa and its environs. Design/methodology/approach – The study adopted a questionnaire survey approach to achieve its purpose. The survey was conducted using purposive sampling techniques. Four categories of variables namely: project design choice, bid invitation and evaluation, Compensation forms and project outcome evaluation were used. Data were collected with the aid of structured questionnaires and analysed to establish the influence of project design choice, bid invitation and evaluation, compensation form on construction project performance, and then evaluate the project outcome using percentage, mean and t-test. Empirical data were collected through a survey of 45 respondents where 30 were engineers and 15 procurement department personnel. Findings/conclusions/recommendation – The results reveals that a number of procurement approaches were used at the same time. It was found that the project was structured to have multiple bids for sections of the project as opposed to the norm where the bid is done for the whole project. Most of the bidders had less than 5 years experience and both compensation methods were used. The cost of the project increased by 17% while completion time increased by 58.3%. It was also found that the client was satisfied with the service and quality of the project and they were not satisfied with the cost and time taken. The study concludes that the procurement procedure has a big influence to the construction project performance. It recommends that one procurement method to be used, contractors/bidders must have over 10 years experience, client have to evaluate the contractors/bidders “technical and financial performance ” before engaging them on a project, cost reimbursement payment method should be used and personnel involved in projects should be taken for project management and contract management training. Research limitations/implications – The study can serve as a learning opportunity for construction project stakeholders internationally, and clients in particularly Kenya Petroleum Refineries limited, to take procurement procedures seriously while undertaking a construction project, now that they are planning for the upgrade of the plant. Since the empirical results are based on data collected from only KPRL employees, international generalizations should be made cautiously.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The construction industry is an important part of the economical backbone in many countries, often accounting for between 7-10 percent of the (GDP) Gross Domestic Product. Furthermore, construction products and processes have a large impact on safety, health and environmental aspects. Since all human beings in modern societies are directly affected by its processes and/or products, the importance of a well-functioning construction industry is beyond doubt (Eriksson, 2007).

Construction Projects are very essential in the development of any community especially as seen in developed countries where projects are taken as a great priority because it is part of the determinant in knowing the level of development of any country. It evolves through the stages of conception, design, and the actual construction. A potential owner initiates the conception process by making clear his needs and requirements in form of a brief to a professional. At the design stage, the relevant professionals translate the primary concept into an expression of a spatial form to satisfy the owner's requirements in an optimum and economic manner. At the construction phase, the conception and design are actualised in a practical terms to satisfy the brief.

A construction project is a complex process that involves many stakeholders, long project durations and complex contractual relationships. As construction procurement has evolved many different types and categories of procurement routes have been developed. Project delivery systems have gone through different stages in their evolution. In early 1900s, most projects were completed under lump sum contracts (the traditional system) and this trend continued for most the first half of twentieth century with only some limited exceptions developed in the private sector to improve costs, schedules and adversarial relationships through contractor centred approaches (design and build) (Dorsey, 2004; Oyegoke, 2001). Construction management (CM) emerged in the 1960s but fully developed in the 1970s in the UK due to the economic recession at that time

(Dowd, 1996), consultative design and build also developed in the 1970s, and program management emerged in the 1980s (Dorsey, 2004) as clients sought more efficient ways to complete complex projects. Other management-oriented approaches like partnering and framework agreements (FA) based upon the concepts of teamwork, integrated teams and collaborative working arrangements became more prominent during the late 1990s and early 2000s (McDermott and Khalfan, 2006).

In many countries the construction industry has, however, attracted criticism for inefficiencies in outcomes such as time and cost overruns, low productivity, poor quality and inadequate customer satisfaction. Practitioners, researchers and society at large have, therefore, called for a change in attitudes, behaviour and procedures in order to increase the chances for construction projects to be successful and result in improved end products (Latham, 1994, Egan, 1998, Ericsson, 2002)

Maizon (2003), mention that the selection of a procurement procedure or method for a given project is a difficult task for the clients due to the various factors governing a construction project. He stated further that different client have differing needs and requirements whereby construction projects vary so considerably and in every respect, that no single method of procurement can be suitable for every project.

Increased complexity, uncertainty, and time pressure in construction projects have increased the need for cooperation among different project actors. Traditionally, relationships are, however, very competitive and adversarial in the construction industry, which to a large extent is due to the customary procurement procedures potentially causing many problems in all stages of the buying process. Therefore, in order to take advantage of collaboration, a procurement procedure is one key improvement area and can contribute substantially to project success. A change of procurement procedures is, however, impeded by clients' habitual behaviour. Although procurement procedures need to be tailored to enhance the fulfilment of different project objectives, clients tend to choose those procurement procedures they have a habit of using, regardless of any differences between projects. In order to enhance change, an increased understanding of

how different procurement procedures affect different aspects of project performance is vital. Earlier research efforts in this area have been limited to the investigation of how a single or a few specific procurement alternatives affect one or two project objectives. In order to achieve successful governance of construction projects a holistic and systemic approach to procurement procedures is crucial. Since a systemic perspective on the effect of procurement procedures on different aspects of project performance is lacking in the construction management literature, this research effort aims to fill this theoretical gap that has potential to bring important practical implications (Cox and Thompson, 1997, Eriksson and Pesamaa, 2007, Eriksson, 2008b).

The Public Procurement system in Kenya evolved from a crude system with no regulations to an orderly legally regulated procurement system. In the past decades, the public procurement system in Kenya has undergone significant developments. From being a system with no regulations in the 1960s, and a system regulated by Treasury Circulars in the 1970s, 1980s and 1990s, the introduction of the Public Procurement and Disposal Act (PPDA) of 2005 and the Procurement Regulations of 2006 has introduced new standards for public procurement in Kenya. In line with the country's public procurement reform agenda, Kenya in 2006 committed itself to become one of the 22 countries participating in the pilot testing a new Methodology for Assessment of National Procurement Systems (version 4) developed by the Organisation for Economic Cooperation and Development/Development Assistance Committee (OECD-DAC) Joint Venture for Procurement . A milestone was achieved in this area with the enactment of the Public Procurement and Disposal Act, 2005 and Public Procurement and Disposal Regulations, 2006. This Act was given commencement date of 1st January 2007 via Legal notice no.171 of 29th December, 2006 (Wittig, 1999). With the enactment of the PPDA (2005) and Procurement Regulations, Kenya today has in place a sound and comprehensive legal framework for public procurement with a clear hierarchical distinction.

There is a number of construction project procurement procedures used in this industry during the buying stage. This study uses procurement procedure which includes project design choice, bid invitation and evaluation, compensation form and performance evaluation.

1.2 Statement of the Problem

Procurement procedures or methods provide the framework for implementation and development of project. Time and serious attention are devoted towards the establishment of a procurement system that will be suitable for a particular project. A procurement method that is used for a particular project is expected to achieve the objectives of the project in terms of cost, time and quality but this has not been the case.

Time and cost overrun have been a major problem confronting the Kenyan construction industry and all attempts that have been made so far have not been able to yield the expected results.

Problems that have been established from various research work that have been carried out in past as result of the use of available procurement methods in execution of construction projects includes high staff strength, time and cost overrun, poor quality delivery e.t.c

These problem of procurement methods adopted in Kenyan construction industry have raises serious concern to the project stakeholders and the construction industry as a whole. The aim of the study is to explore the influence of procurement procedures on construction project in Mombasa and its environs.

1.3 Purpose of the study

The purpose of this study was to explore the influence of procurement procedures on construction project performance.

1.4 Objectives of the study

The Study had the following objectives:

1. To establish the extent to which Project design choice influences the construction project performance.

2. To find out the influence of bid Invitation and evaluation on construction project performance.
3. To assess the influence of compensation form on construction projects performance.
4. To evaluate the actual performance of the construction project after following the procurement procedures.

1.5 Research Questions

The Study was to answer the following questions:

1. To what extent does project design choice influences the construction projects performance?
2. What are the effects of bid Invitation and evaluation on construction projects performance?
3. How does compensation form influence construction projects performance?
4. How did the construction project actually perform after following the procurement procedures?

1.6 Research Hypotheses

This study was to test the following hypotheses,

1. H_0 : Project design selection does not significantly influence the construction project performance.

H_1 : Project design selection significantly influences the construction project performance.

2. H_0 : The bid invitation and evaluation does not significantly influence the construction project performance.

H_1 : The bid invitation and evaluation does significantly influence the construction project performance.

3. H_0 : The compensation form does not significantly influence the outcome of the construction project performance.

H_1 : The compensation form does significantly influence the outcome of the construction project performance.

4. H_0 : The construction project did not significantly perform well as per the expectation.

H_1 : The construction project did significantly performed well as per the expectation.

1.7 Justification of the study

During the implementation or the construction of the power plant at Kenya Petroleum Refineries, Mombasa, the plan was to take 12 months for the project to complete but we ended up taking 19 months for it to complete. This was due to the procurement of long lead items. As the manufacturers and suppliers changed delivery time of electrical items namely synchronizing panel for the sub-station and current and power transformers at the electrical control room. This lead to time overrun of 7 months more than planned. This also increased the cost of project construction by 20%. Hence this study is important for the project management team to get the learning points so as to use them for future projects and especially the upcoming refineries upgrade.

1.8 Significance of the study

This research study was to take an in-depth investigation on the effects of procurement procedures and the result of this study is of great importance to the aspect of project procurement, project delivery and project execution as a whole.

The findings and recommendations of the study intend to assist the management of Refineries to formulate effective strategies towards addressing the problem of poor

procurement procedures of construction projects which usually leads to either failure of the project or cost overruns.

The study also enhance understanding of the procurement procedures and how it influence the construction projects in terms of economical performance, time performance, quality, environmental performance, work performance and innovation. This may be used by the project managers in construction industries and green field projects (new projects which are started from the ground).

It also provides relevant and useful information that is of importance to the client (both public and private organisations) for their activities and for future research on the subject matter.

Finally the research contributes to the body of knowledge in the construction project management industry by giving detailed insight into the purpose, importance and effectiveness procurement procedure or method.

1.9 Basic Assumptions of the study

This study was based on the following assumptions:-

1. That the respondents have adequate knowledge on the subject to give meaningful responses relevant to the study.
2. Respondents would be ready to spare their time to participate in the study and give their views without prejudice.
3. The researcher will obtain support of the Refineries management in terms of funding and participation.

1.10 Delimitations of the study

This study was conducted at Kenya Petroleum Refineries limited premises in Mombasa. The study was done on the construction of 9.2MW power plant. This helped the researcher to do data collection faster as the entire respondent come from the company even though they come from different departments.

1.11 Limitations of the study

The limitations for this study were due to the following factors:-

1. The limitation of this research are subjected to the information provided by the management of various relevant stakeholders and association in relation to procured project such as clients (organisation management) and engineers involved in previous projects. More also the research is limited to the area were the researcher is allowed to investigate in the construction within the organisation.

The categories considered in the study are heavy construction also called “Horizontal construction” and the highway/heavy construction and building construction also called “Vertical Construction”.

The researcher intends to use the information provided by the management of various stakeholders as the true information reflecting what actually happened during the undertaking of the project. The researcher also intends to seek permission to be allowed to investigate the entire construction of the project.

1.12 Definitions of Significant terms used in the study

Procurement is the acquisition of goods or services. It is favorable that the goods/services are appropriate and that they are procured at the best possible cost to meet the needs of the purchaser in terms of quality and quantity, time, and location (Weele 2010).

Procedure is a fixed, step-by-step sequence of activities or course of action (with definite start and end points) that must be followed in the same order to correctly perform a task.

Procurement procedure is the overall process of putting a contract out for tender, starting with the publication of a procurement notice or sending the invitations to bidders and ending with the award of the tendered contract.

Construction is a process that consists of the building or assembling of infrastructure. In general, there are four types of construction are Residential Building construction, Industrial construction, Commercial Building construction and Heavy Civil construction

The term **procurement system** refers to a project execution and delivery process and it describes the responsibilities and/ or contractual obligations of the parties to carry out the numerous activities involved in delivering a project to the owner. According to Ojo (2009), Procurement involves the various combination of the design and construction phase to achieve the forms of organization to implement the project.

1.13 Organisation of the study

This study consists of chapter one to five, preliminary pages consisting of the declaration, dedication, acknowledgements, table of contents, list of tables, list of figure, acronyms and abbreviations and the abstract. The appendices are listed at the end of the document and include the relevant authorities given for the study to be conducted and questionnaires used for the study.

Chapter one presents the background of the study, problem statement, purpose and objectives of the study which will be drawn from four identified independent variables. The research hypotheses, significance, delimitations, limitations and basic assumptions of the study will be presented in this chapter. The chapter also includes the definition of significant terms as will be used in the study.

Chapter two presents a review of literature with particular focus on the effects of procurement procedures on construction project. It provides the background on procurement procedures and construction project. It also presents a historical background on procurement of construction project in the world and in Kenya. This chapter provides

an in-depth analysis of each independent variable and how it affects the construction project in both the global and a local perspective.

The research methodology is being explained in chapter three. The research design, target population, sample size and sampling procedure, data collection methods, procedures and analysis are clearly outlined in this chapter. The chapter also contains discussions on the validity and reliability of the research instruments and the ethical issues taken into consideration during the study.

Chapter four presents the findings of the study and the analysis of the data collected from the respondents. The findings are being presented systematically according to the earlier stated objectives.

Chapter five presents a summary of the findings, conclusions, recommendations and suggests areas for further studies. A full discussion of the key findings has also been included in this chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the literature related to the procurement of construction projects and the effects of the procurement procedure.

2.2 Construction Procurement models

The construction industry has developed a number of different models for allocating and managing the key construction risks of timeliness and cost of completion as between principals and contractors.

The most appropriate model for a particular project will depend on the principal's confidence in its own ability to retain and manage risk, the scope and nature of project risks and the project's financing structure. For example, a limited recourse (project finance) structure invariably requires a substantially enhanced transfer of risk to the contractor (Masterman, 2002).

2.2.1. The Traditional or Conventional procurement model

In the traditional procurement model, the design process is separated from construction, and full documentation is generally required before a contractor is invited to tender (Dalrymple et al, 2006).

The principal maintains control over design, quality and standards through its consultants, while design and construction are sequential processes. As a result, programming tends to be a relatively long process.

In this model, the principal has reasonable certainty on construction costs, as the contract sum is known at the outset (although it may be adjusted), and speculative risks are balanced between the parties depending on the form of traditional procurement risk model adopted (Masterman, 2002).

It can be a relatively low-risk procurement option for a principal but the project will likely take longer to complete.

Walker and Hampson,(2003) States that this model uses three main mechanisms for determining a contract price:

- i. lump sum contracts, where the contract sum is largely determined before full construction starts;
- ii. measurement contracts, where the contract sum is not finalised until after completion by a re-measurement of the works on a previously agreed basis; and
- iii. Cost reimbursement contracts, where the contract sum is determined on the actual cost of labour and materials, with an amount added to cover overheads and profit.

Each of these mechanisms represents an incremental increase in the level of pricing risk assumed by the principal.

2.2.2. The Design and Build procurement model

Under this procurement model, the contractor undertakes both the design and construction of the work for an agreed price (Chan, 2001).

The principal may retain control over the design elements included as part of its statement of requirements (or may transfer design risk in those elements to the contractor) but does not have direct control of the development of the contractor's detailed design (Bower, D, 2003).

As design and construction may proceed in parallel, this could result in a shorter overall project timeframe. The principal will have reasonable certainty over construction costs because the contract sum is known at the outset.

In this model, the speculative risks lie largely with the contractor, but this balance can shift depending on the level of design responsibility retained by the principal and the manner in which the contract price is calculated (Masterman, 2002). In most common wealth countries, design build procurement is often used in conjunction with a cost risk sharing mechanism, described in more detail below.

In terms of cost and time, this is a relatively low-risk procurement option for a principal, as most forms of design and build contract (particularly in the context of limited recourse financing) have a relatively onerous balance of risk in favour of the principal (Ross, J, 2003).

a) Concept and characteristics of design and build

A basic concept in Design and Build procurement is that it requires the project to be contracted to a single organization which is responsible for design, procurement, and engineering and commissioning. The first step before choosing a procurement method should be through analysis of the project's characteristics on a global basis, including those technical requirements for design and construction (Masterman, 2002). The project's owner will ensure that the entire context in which the project be delivered is thorough understood and can be accounted for in plans for schedule, price and quality. Once the owner has determined all the external constraints that might impact on its project, a project procurement method can be selected.

There are quite many good reasons why an owner would select Design and Build for a given project. There's a list of reasons for which an owner might decide that a project is suitable for the use of Design and Build procurement method. It would be:

- i. Where a compressed delivery schedule is required;
- ii. A single point responsibility is required,
- iii. Constructability consideration drive the design concept or details,
- iv. Unique factors require special knowledge or experience to produce the least-cost design,
- v. The owner/designer must rely on the builder to optimize technology with cost,

- vi. The project will site-adapt a previous design,
- vii. The project is a common commercial facility,
- viii. The project is beyond the owner's technical capability,
- ix. Lastly, where risk can be shared to reduce cost.

This can be supported by Masterman (2002), who argued that the definitions of the Design and Build contains three elements that would fundamental characteristics of this system, which are; the responsibility for design and construction lies with one organization, reimbursement is generally by means of a fixed price lump sum, and project is designed and built specifically to meet the needs of the client.

b) Outcome of projects procured by traditional contract and Design-Build (DB) method.

In a study that compares the outcome of projects procured by management contracting and traditional contract, Naoum (1991) discovers that clients are satisfied with the outcome of traditional contract projects. In another study, Ojo et al. (2000) discover that projects procured by traditional contract method overrun their initial cost by 53.3 per cent. In a survey of the outcome of projects procured by DL and traditional contract methods, Idoro (2007) discovers that projects procured by traditional contract method overrun their scheduled delivery time by 49.38 per cent and overrun their budget by 28.40 per cent. These studies indicate that projects procured by traditional contract method are prone to high overrun in delivery time and cost.

Several studies have attempted to compare the outcome of projects procured by the two methods. In one of such studies, Rowlinson and Newcombe (1986) discover that while the cost-overruns in projects procured using the two options are the same, the time-overrun in projects procured by traditional contract is considerably higher than that of projects procured by DB option. The duo discovers that the cost-overrun in traditional contract and DB projects is 4 per cent while their time-overruns are 70 and 40 per cent, respectively. In another study, Konchar and Sanvido (1998) discover that DB option solves many problems inherent in traditional contract method and that DB projects experience 5.2 per cent fewer changes when compared with traditional contract projects that experience 11.4 per cent more changes in schedule. In another study, Pocock et al.

(1996) maintain that projects procured by DB method are better than those procured by traditional contract method in all measured parameters including cost growth, schedule growth, number of contract modifications per millions of dollars and percentage of changes due to design inefficiency.

Also, in another study that compares the outcome of projects procured by traditional contract and DB methods, Ling et al. (2004) discover that privately owned buildings are more expensive when procured by traditional contract. A similar study conducted by Idoro (2006) discovers that clients' satisfaction with the delivery time, cost and quality of projects procured by the two methods and their time-overruns, cost-overruns, percentage of time-overrun to initial contract period and the percentage of cost-overrun to initial contract sum are significantly the same. These studies have divergent findings. The findings of some studies indicate that the outcome of projects procured by the two options is the same, while the findings of others show that the outcome of projects procured by DB is better than those procured by traditional contract.

2.2.3 The Management procurement model

In this model, overall design is the responsibility of the principal's consultants, while the contractor is responsible for managing the performance of the works through separate trade contracts (Masterman, 2002).

The principal appoints the consultants and prepares the project drawings, specifications and cost plan, and retains overall design control through its professional team.

As detailed design can proceed in parallel with construction work, the length of the project programme may be reduced.

However, there is no certainty over costs at the outset and works proceed on the basis of a contract cost plan. Final costs are not known until the last trade contract is let. Speculative risks lie largely with the principal.

This form of procurement model requires in-house expertise and a good working relationship with trade contractors. In terms of design and quality, this is a relatively low-risk procurement option for principals, but high risk in respect of costs and time.

There are two principal forms of management procurement model.

In management contracting, a management contractor undertakes to perform the works through trade contractors who are contractually accountable to the management contractor.

However, the management contractor is not strictly liable for the consequences of any default by trade contractors – as long as the management contractor has complied with its management obligation (generally a skill and care obligation) under the management contract, although there may also be incentive elements in the fee payable to the management contractor.

In construction management, a construction manager undertakes to manage the works through trade contractors but the principal remains involved in directing the project and trade contracts are made directly with the principal.

2.2.4 Other risk management mechanisms

There are two main risk management mechanisms which can also be used namely Allinacing and Cost risk sharing.

a) Alliancing

An alliance contract (or project alliance) is an agreement between two or more entities that undertake to work cooperatively, reaching decisions jointly by consensus and using intensive relationship facilitation. The entities work together to achieve agreed outcomes and share project risks and rewards, relying on good faith and trust. Alliancing allows all major contractors and consultants to become “stakeholders” in a project and share in the gain or loss arising, measured against identified goals.

The principal, contractor and other project “stakeholders” form a co-operative group in which everyone involved shares representation and risk. The intent is to generate an environment of innovation and co-operation rather than confrontation.

Generally the principal, consultants and the contractor/s form a committee to manage the project. All project matters, including disputes, will be referred to and decided by the committee, and its members will agree a common approach to the project, the assessment of project cost, and a reasonable time for completion (John F.Y. *et al*, April, 2007).

Members of the committee will often agree that they will make no claims against each other, with certain exclusions. Alliance costing is generally “open book” – usually all members of the committee have access to project cost information.

Principals often favour alliancing because they believe it will achieve savings by giving greater latitude in design and construction to the alliance team process, focusing on collective objectives and incentivising team members through risk-and-reward mechanisms. In addition, it is a flexible process that can vary significantly in its applications to different projects.

Alliancing has had considerable success in achieving cost reductions for principals, and its approach to risk (or rather, risk sharing) constitutes a major departure from traditional contracting models.

Contractors and principals can share risks that would otherwise be traditionally borne solely by contractors, and contractors can eliminate certain risks from their pricing analysis.

However, the extent to which other incentive structures are used to modify the “Law of the Jungle” that can often apply to construction contracting and claims varies widely between alliances.

In order to be a robust structure – that is, one that operates as an effective incentive even if the other participants are altruistic “knights” or self-interested “knaves” – it is critical

that the alliance incentivise contractors to perform in a manner consistent with the principal's goals of timeliness and cost (John F.Y. et al, April, 2007).

In order to produce a robust structure, alliancing is often used in conjunction with a target cost mechanism, and establishing the target cost is therefore a key aspect of the alliancing contract.

b) Cost risk sharing: target cost and guaranteed maximum price

A target cost contract occupies the middle ground between a lump sum contract (where the contractor substantially takes the risk that the contract sum might not cover the cost of the works) and a reimbursement contract (where the price risk falls on the principal as the contractor's costs are reimbursed in full).

With a target cost contract, the actual cost of completing the project is compared with an agreed target cost. If the actual cost exceeds the target cost, some of the cost overrun will be borne by the contractor (Iyer, K. & Jha, K., 2005).

If the actual cost is lower than the target cost the contractor will share the saving with the principal. In each of these scenarios, costs will be allocated in accordance with a previously agreed formula. Cost sharing may be under a conventional procurement structure, or an alliancing structure, or both.

This approach helps to align the interest of the parties since both have an interest in working together to reduce the cost of the project. It is vital, however, that there is clarity as to the categories of costs that are not to be included in the definition of actual cost and target cost. Close consideration should therefore be given to contingencies, overheads and profit, and risks which are not shared (Love, P. E. D., Tse, R.Y.C. and Edwards, D.J. ,2005)

A guaranteed maximum price (GMP) contract is a species of target cost contract commonly encountered in New Zealand and Europe. Under a GMP contract, a principal shares in upside cost risk (by sharing in cost savings where actual cost is less than the

GMP) while passing downside cost risk to the contractor (in that the contractor will not be paid its actual cost to the extent the same is in excess of the GMP).

Target cost and GMP contracts can provide an answer in situations that are rapidly changing or difficult to quantify, but they require excellent project management.

A key issue is the adequate definition of a target cost or GMP at the time of contract signature and the basis on which the target cost or GMP will be subject to adjustment as circumstances vary. Neither target cost nor GMP contracts are a simple answer to the issue of cost risk. Both still require a rigorous assessment of the risk allocation in the underlying contract to ensure the target cost or GMP is an effective mechanism for transferring cost risk to a contractor (Love, P. E. D., Tse, R.Y.C. and Edwards, D.J., 2005)

2.2.5 Summary of Models

There are a number of approaches to construction procurement. The most appropriate approach for any given project will depend on a number of factors:

- i. Degree of control by principal: should design be wholly in the hands of the principal's consultants, and to what extent should the principal have control over programming?
- ii. Certainty of cost: is a lump sum contract preferred?
- iii. Programming flexibility: is this desirable?
- iv. Start and completion times: is a "fast track" project with the shortest overall programme your priority?
- v. Changes during construction: can the contractor easily accommodate variations, and is there the likelihood of design changes during the course of the works?

Principals need to carefully (and honestly) assess which procurement model is right for their project. Choosing the wrong model may merely be a recipe for disputes or lead to poor value for money.

2.3 Project Design Choice or Model choice and project performance

There are a number of possible choices regarding the design stage which by the end of it affects the relationships between the design choice and the project performance as outlined below.

The design stage is very important for many aspects of project performance, such as life cycle costs, project costs and schedule (Andi and Minato, 2003, Faridi and El- Sayegh, 2006). In fact, defective design has been found to cause 30% of cost and time overruns in construction projects (Andi and Minato, 2003). Adequacy of plans and specifications and a design with high constructability have been identified to improve overall project performance (Chua et al., 1999). The client can choose varying degrees of detail in the design work. The extremities are to specify the technology in detail (i.e. design-bid-build contracts) or merely the performance and functions of the product (i.e. design-build contracts). In design-bid-build contracts the client performs detailed design work together with consultants before contractors are procured, in order to develop a solid base for competitive bidding. In design-build contracts, contractors are procured very early based on the project brief or sketchy drawings, after which the contractor performs detailed design. This facilitates solutions with high constructability, due to contractor focused design (Tam, 2000).

The drawback is diminished client influence in the design work. Between these extremes, where design relies heavily either on the client or the contractor, there are alternatives in which the client and the contractors together with consultants cooperate in developing the detailed design. As for design-build, the contractors need to be involved early in the design process. This approach is often called joint specification (Eriksson and Nilsson, 2008) or concurrent engineering, since it make parallel and integrated design and construction possible (Brown et al., 2001).

A high degree of specification prior to contractor procurement results in a divorce between design and construction, since construction planning cannot affect design (Eriksson and Laan, 2007). This separation results in long project durations (Love et al., 1998) and decreased innovation due to lack of joint problem-solving. The literature shows some positive results for both design-build and for design-bid-build. Looking at design-build contracts, these have shown to provide better value for money and reduced project duration, compared to design-bid-build contracts (Tam, 2000). Other studies show that design-bid-build contracts have ensured quality better than design-build contracts (Cheung et al., 2001). A complete design before construction also improves budget performance (Chua et al., 1997).

In order to decrease the risk for defective design increased coordination between designer and contractors is suitable (Andi and Minato, 2003). Early involvement of contractors in concurrent engineering facilitates cost saving and shortened project duration due to increased buildability (Brown et al., 2001) and reduced rework (Love et al., 2004), increased client satisfaction since the client maintains the possibilities to influence and control the design work (Eriksson, 2008b) and improved environmental performance (Cole, 2000), work environment (Cameron and Duff, 2007), and innovation.

2.4 Bid Invitation, Evaluation and project performance

2.4.1 Bid Invitation

Owners use invitation to bid letters to invite bidder proposals or bids for their construction projects. Bids packages may be transmitted with the invitation to Bid letter or distributed pre-bid meetings. The former is preferred to give bidders more time to review the documents, develop work plans and list the questions. The invitation to bid does not become a contract document (Charles. S. Phillips, 1999).

Laws regarding public procurement restrict public sector clients' bid invitations to open invitations in which all contractors are welcome to submit bids. The purpose is of course to enhance competition and transparency. The drawback is that it hampers long-term

development in lasting relationships since actor constellations are changed in every project (Dubois and Gadde, 2000). Hence, private sector clients often utilize the possibility to invite a limited amount of trustworthy contractors, or even negotiate directly with only one selected contractor (Eriksson, 2008).

By using a large pool of potential suppliers who are often replaced, buyers facilitate competition and a focus on price and short-term benefits, which according to Anderson and Oliver (1987) is related to output control. Social control involves investments in the partner's socialization, enhanced by long-term relationships and expectations of continuance. Process control is also related to a long-term focus, since it removes incentives to sacrifice long-term for immediate pay-offs (Anderson and Oliver, 1987). Negotiations with only one or very few suppliers therefore indicate social and/or process control, while open bid procedures indicate price focus through output control. Consequently, the larger the number of bidders, the higher the emphasis on price and the lower the emphasis on trust and authority and vice versa (Eriksson, 2006).

Invitation of a limited number of bidders decreases project duration due to shortened bidding stage (Lam et al., 2001). Invitation of a limited number of bidders also increases the chance for lasting relationships and a continuous workload over time for the selected contractors, which facilitate improved innovation (Manley, 2008) and the development of knowledge about the clients and their demands, which is important for client satisfaction (Eriksson, 2009). Since one key factor of keeping a safe and healthy work environment is continuity, a smaller set of trusted invited bidders is likely to lead to a better project work environment. Also environmental management and sustainable development require continuity and a long-term perspective, which should be facilitated by long-term relationships. For economical performance, the outcome is less certain. While an open bid is likely to result in a lower bid (and potentially a lower overall project cost), a closed bid may be better in terms of avoiding cost overruns as there is less reason for underestimating costs for bidders in this situation.

2.4.2 Bid Evaluation

Selecting a capable contractor is one of the most important tasks faced by clients who wish to achieve project success (Fong and Choi, 2000). Bid evaluations can include many different parameters, such as bid price, technical competence, management capability, earlier experience, reference objects, environmental and quality management systems, financial stability and collaborative skills (Lam et al., 2001). Traditionally, clients set a very high weight on price and lower weight on soft parameters, especially among public clients (Fong and Choi, 2000). Recently, there has, however, been growing interest for a shift from lowest price selections to multicriteria selection also considering soft parameters. While bid price is related to competition, all other aspects can be seen as aspects determining the potential for collaboration in the project (Eriksson, 2008). When focusing only on the lowest tender price, the client does not take the opportunity to affect the characteristics of the supplier, indicating a *laissez-faire* approach, which, according to Anderson and Oliver (1987), is related to output control. For instance, suitable competencies and capabilities will provide a basis for better integration between client and contractor. Likewise, earlier experience (especially if it shared) provides a path for how collaboration can be organized.

High weight on lowest bid price increase the risk for opportunism and conflicts and hampers cooperation since contractors often bid low to get the job and then search for “extras” to achieve profitability (Ng et al., 2002). Focus on low bid price also increase the risk for cost and schedule growth due to several change orders (Assaf and Al-Hejji, 2006).

Factors related to competence and experience, such as poor site management, supervision and planning on behalf of the contractor, are common causes of cost and time overruns (Assaf and Al-Hejji, 2006) and poor customer satisfaction (Maloney, 2002). Careful partner selection (through bid evaluation based on suitable soft parameters) considering desired competences, experiences and attitudes can therefore reduce cost growth (Chua et al., 1997) and time overruns (Chan and Kumaraswamy, 1997), and improve quality performance, work environment, and innovation. Environmental management systems

(EMS) may not guarantee improved environmental performance. Instead, relevant training, expertise and commitment among management staff is the most important success factor for improvements in this area (Shen and Tam, 2002). Most clients are, however, not committed to environmental performance, but for those who are, the inclusion of environmental management aspects in tendering requirements is important (Shen and Tam, 2002). Hence, bid evaluation based on suitable soft parameters that consider various environmental aspects can improve environmental performance.

Thus, as for bid invitation we see links to all success criteria, but the relation to economic performance is uncertain. A strong focus on bidding price is certain to bring down the bidding price and likely also get a low overall project cost. However, cost overruns are more likely. Therefore, we refrain from putting forward a proposition for economic performance.

2.5 Compensation Forms and project performance

Fixed price for a product delivered is the most common form of compensation (Eriksson and Laan, 2007). This compensation makes the bid evaluation easier since the client easily can compare the different contractors' bid prices. It will also provide the client with a more or less accurate estimation of the total project cost already in the bid evaluation stage. The opposite type of compensation is cost reimbursement, which means that the contractor receives payment for all costs arisen in the project, decreasing the financial risk for the contractor (Korczynski, 1996). Between these extremities there are alternatives based on reimbursement payments including gain share/pain share agreements based on a target price (Eriksson and Laan, 2007).

Fixed price compensation increase the risk for opportunism and conflicts and hampers cooperation (Eriksson, 2008). Compensation based on incentives connected to different aspects of project objectives facilitates economical performance (Tang et al., 2006), time performance (Eriksson, 2009), quality (Eriksson, 2009), innovation and a good project performance in total. Furthermore, incentive-based compensation facilitate improved environmental performance and work environment if the reward to project participants is connected to environmental aspects, such as reduced amount of waste and accidents.

2.6 Project Performance Evaluation

The control of work in progress and the final product can either be executed by the client or by the contractor. Traditionally, construction clients perform most of the control instead of leaving it up to the contractor. End inspections of the finished product are traditionally very comprehensive, consuming both time and money without adding any value (Eriksson, 2009).

Tight monitoring of contractors' behaviour and performance increase the risk for opportunism and hampers cooperation (Korczyński, 1996). Increased reliance on contractors' self control can instead save both money and time (Eriksson, 2009) due to earlier identification of defects and a less comprehensive end inspection. Self-control also has the potential to increase the contractors' concern for quality since they cannot rely on others to control the quality of their work (Eriksson, 2009).

2.7 Collaborative Tools

In construction transactions, the actual production takes place within the buying process, since there is no standardised ready-made product to buy. Since the client and the contractors have to interact to create the product, use of collaborative tools for joint action may be suitable (Eriksson, 2007). Examples of such collaborative tools are: joint objectives, joint office building, teambuilding activities, partnering facilitator, joint IT-tools, joint risk management, and relational norms based on a partnering contract (Eriksson, 2009).

High usage of collaborative tools will improve cooperation (, Cheng et al., 2001, ,Eriksson, 2008b). For instance, joint objectives facilitate the development of a win-win situation in which all actors are striving together towards the same goal (Eriksson, 2008b). Joint IT-tools enhance integration and communication among different project actors (Cheng et al., 2001). Joint risk management (JRM) is a good way of dealing with risks that are unforeseen and unquantifiable during the planning stage (Rahman and Kumaraswamy, 2004). Since these kinds of risks are common in construction projects, JRM will provide a tool that solves problematic situations before they become disputes and thus paves the way for collaborative action. In most countries the construction industry relies heavily on standard forms of contracts, which hamper joint problem-solving and cooperation since they work as a wedge to drive distance between the actors

(Pietroforte, 1997, Thompson et al., 1998, Eriksson and Laan, 2007). Hence, it is important that formal contracts are coupled with relational norms in order to enhance cooperation (Eriksson, 2008b, Bosch-Sijtsema and Postma, 2009). Relational norms, which can be based on a mutually agreed partnering contract, give the actors a sense of acceptable and deviant behaviour, increasing the predictability and decreasing the need for controlling each other (Eriksson, 2008b, Eriksson, 2009). A joint project office on site in which all members of the partnering team is located facilitates an increased face-to-face encounter which is important for solving problems together in early stages (Barlow, 2000).

2.8 Collaborative Climate

For collaborative relationships, such as partnering, to function well a good collaborative climate is needed. In this study, the collaborative climate consists of trust and commitment. Many studies have shown that mutual trust (Ng et al., 2002) and commitment (Ng et al., 2002) among the project actors is needed for collaboration to work well. Even though trust and commitment are distinct concepts, they often tend to correlate strongly – where there is trust, there is commitment, and where trust is missing, so is commitment. Trust is a key component of collaboration (Anvuur and Kumaraswamy, 2007) and it works as a glue to bind the parties together. The more the parties trust each other, the less effort they need to exert to accomplish common tasks. The reason for this is that less effort is used for controlling the other party, which is needed when trust is low. If trust is the glue, commitment determines its strength. Where there is strong commitment, collaboration is likely to be tight. Thus, in projects where trust and commitment are present and the collaborative climate is good, the collaborative procurement procedures are likely to bear more fruit and we therefore propose.

2.9 Success Criteria Reflecting Project Performance

Traditionally, researchers and organisations have focused on the three project performance criteria of cost, time and quality (Chan and Chan, 2004, Swan and Khalfan, 2007). Recently, many studies have, however, included also other performance aspects, such as health and safety (Chan and Chan, 2004), environmental performance (Chan and

Chan, 2004, Swan and Khalfan, 2007), customer satisfaction (Chan and Chan, 2004,), and innovation. Next, we will briefly outline five areas in which construction projects are evaluated and consequently can be seen as success criteria.

2.9.1 Economic performance

This has traditionally been seen as one of the most important areas – if the economy of the project is off, the project can seldom be seen as a success. Overall project cost, i.e. the overall cost that a project incurs from inception to completion, is of major interest as it shows the resource usage in economical terms. Another important aspect regards cost predictability, that is, whether the final overall cost is in line with the initial cost estimate (Swan and Khalfan, 2007). Cost overruns can be a source for problems for an otherwise successful project as contractors are frequently criticized for the common occurrence of cost overruns (sometimes labelled cost growth) in construction projects (Chan and Chan, 2004).

2.9.2 Time performance

The increasing importance of time in our globalised society has affected the construction industry in form of shortened project schedules. Project duration is simply the number of days/weeks/months from start to completion of the project. Since time can be a critical issue for many clients, project duration is often of prime interest. However, schedule overruns may be an even more important issue. Completing projects in a predictable manner on time (within schedule) is an important indicator of project success and the construction industry is frequently criticised for project delays (Swan and Khalfan, 2007). Schedule overruns (sometimes labeled time growth) are often very negative since they hinder the client to start using the end product as planned.

2.9.3 Quality

Satisfactory time and cost performance is of little value if the project delivers inferior quality. The concept of quality is closely related to customer satisfaction, which has gradually been elevated in importance in the construction industry (Egan, 1998). Customer satisfaction is commonly described as a comparison between the customer's

pre-purchase expectations and their post-purchase perceptions. Hence, it involves the customer's final feelings about whether the outcome provided a satisfying or dissatisfying experience (Forsythe, 2007). Since construction industry products are highly customised and co-created during the construction process, the concept of quality regards both the final product and the process during which is created. Therefore, we see two main aspects of quality. First, quality of end product has to do with the users' satisfaction with the finished construction and it is a critical success factor (Forsythe, 2007). It is also related to how the final product and its function meets the specification (Chan and Chan, 2004). The second aspect of quality is the service quality during the construction process, which reflects the client's perception of the process during which project participants interact to create the end product (Forsythe, 2007).

2.9.4 Environmental performance

Environmental management in construction has become a critical issue in recent decades since the actors start to acknowledge that the construction industry is one of the major contributors to environmental problems (Tam et al., 2006a, Tam et al., 2006b). Environmental impact is affected by both the activities performed during the construction process and the material and technical solutions incorporated in the end product (Crawley and Aho, 1999). Furthermore, the environmental performance depends not only of choices made but also how these choices are executed. Hence, two main aspects can be identified within this area.

First, it is in what degree the construction actors make environmentally friendly choices of material and processes, i.e. in the planning and procurement choose those material and those methods that will leave the least environmental "footprint" over the construction's life span (not only the construction period). Second, it is about how the material and processes are used during construction, i.e. environmentally friendly use of material and processes. With little concern over environmental impacts, excess loss of material and improper waste treatment are always common in the construction industry (Tam et al., 2006b).

2.9.5 Innovation

Traditionally, the construction sector has been seen as a low tech industry, with little innovation compared to other industries (Reichstein et al., 2005, Harty, 2008). Actually, many of the problems outlined in the introduction can be seen as symptoms of a lack of new thinking and innovative action. During recent years, innovation in construction has received increasing interest in an explicit manner, both among practitioners and academics. Innovation thus seems to be a success criterion to be reckoned with. There are two aspects of innovation. First, product innovation implies innovation in the final construction, for instance in terms of innovative architecture or innovative features in other aspects of the building. Second, process innovation, is about novel ways to work with the actual construction phase. It can comprise new ways to organize the work, new construction methods, etc.

2.11 Conceptual Framework

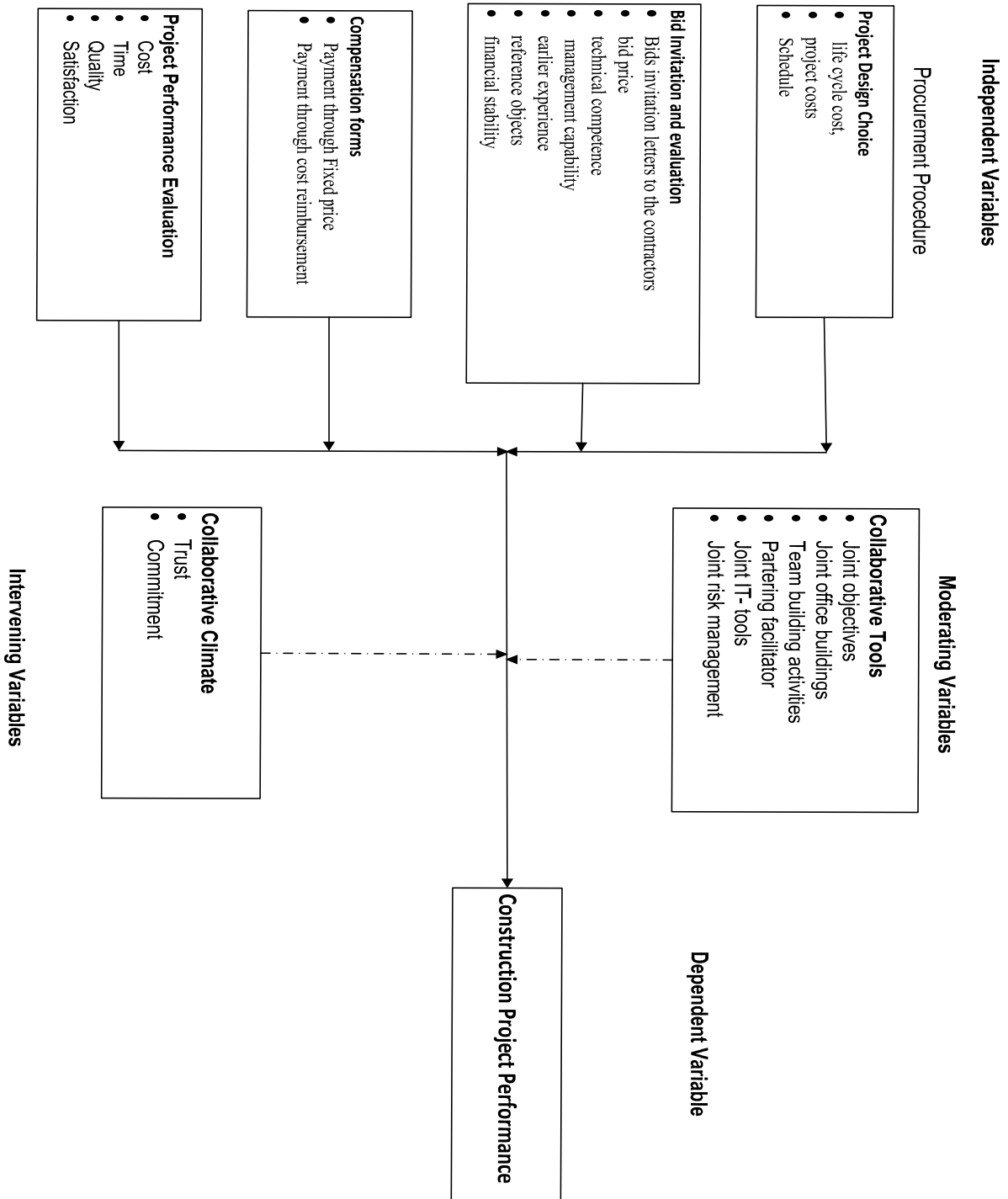


Figure 1: A conceptual framework of the influence of procurement procedure on construction project.

In the conceptual framework depicted in Figure 1, shows how chosen procurement procedure affect construction project which they are outlined as project design choice, bid invitation, bid evaluation and compensation forms. The framework assumes that the above factors directly influence weather the project will fail or succeeds. However, this relationship may be altered by collaborative tools and the collaborative climate.

2.12 Summary of literature

Several studies have attempted to compare the outcome of projects procured by the two methods (Traditional and Design and build). In one of such studies, Rowlinson and Newcombe (1986) discover that while the cost-overruns in projects procured using the two options are the same, the time-overrun in projects procured by traditional contract is considerably higher than that of projects procured by DB option. The duo discovers that the cost-overrun in traditional contract and DB projects is 4 per cent while their time-overruns are 70 and 40 per cent, respectively.

Traditionally, researchers and organisations have focused on the three project performance criteria of cost, time and quality (Chan and Chan, 2004, Swan and Khalfan, 2007). Recently, many studies have, however, included also other performance aspects, such as health and safety (Chan and Chan, 2004), environmental performance (Chan and Chan, 2004, Swan and Khalfan, 2007), customer satisfaction (Chan and Chan, 2004,), and innovation.

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The following are suggestions as to what future researcher should focus on:

1. A comparative study of the effect of cost variation on construction project performance;
2. A comparative study of the effect of contract variation on project timeline

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodology that was used to conduct the research. The research design, target population, sample size, sampling procedure, data collection methods and procedure, the validity and reliability of the research instruments, ethical considerations and data analysis and presentation techniques are discussed in detail. The operational definition of variables is provided in the final of this chapter.

3.2 Research design

According to Burns and Grove (1999), the design of a study is the end result of a series of decisions made by the researcher concerning how the study was conducted. The design is closely associated with the framework of the study and guides planning for implementing the study. It is a blueprint for conducting the study that maximises control over factors that could interfere with the validity of the findings. According to Polit and Hungler (1995), researcher designs vary with regard to how much structure the researcher imposes on the research situation and how much flexibility is allowed once the study is under way. The research designs of most quantitative studies are highly structured, while the research designs in qualitative studies are more fluid. This allowed a structured approach, where data was collected by means of a structured questionnaire.

This study was conducted through descriptive survey research design. A survey is a research design where the researcher attempts to collect data from members of a population in a bid to determine the current status of the population with regard to one or more variables (Adeyemi and Adu, 2010). Descriptive survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals (Orodho, 2004). The design is ideally suitable for studies where data is intended to describe existing conditions (Simiyu, 2009).

Survey studies are classified as descriptive or exploratory research design. Lo Biondo-Wood and Haber (1994) point out that the term “exploratory”, “descriptive” and “survey”

are used either alone, interchangeably or together to describe the design of a study. According to Polit and Hungler (1999), description can be a major purpose of both qualitative and quantitative research studies. With the descriptive design, the researcher plans to gain more information about a phenomenon within a particular field of study.

3.3 Target Population of the study

A population is the total group of subject that meets a designated set of criteria. Polit and Hungler (1999) distinguish between the target population and the accessible population. The target population includes all the cases about which the researcher would like to make generalizations. The accessible population comprises all the cases that conform to the designated criteria and are accessible to the researcher as a pool of subjects for a study. The entire organisation has a population on 291 workers both on permanent bases and on contract. The target population comprised of 150 Engineers and procurement department personnel who are employed by Kenya Petroleum Refineries Limited and have once been involved in Projects regardless of the size.

3.4 Sample size and Sampling techniques

The study was conducted from two groups of respondents, engineers who have been involved with the power plant project and procurement personnel who have been employed by the company. The researcher used purposive sampling for this study. This study therefore was conducted from 45 respondents, 30 from engineers and 15 from procurement personnel as have been explained below.

Purposive sampling, a procedure that involves the selection of persons who represent the desire population was be used. This is non-probability sampling method which involves the conscious selection of certain subjects to be included in the study. Purposive sampling represents a group of different non-probability sampling techniques. Also known as judgmental, selective or subjective sampling, purposive sampling relies on the judgement of the researcher when it comes to selecting the units (e.g., people, cases/organisations, events, pieces of data) that are to be studied. Usually, the sample being investigated is quite small, especially when compared with probability sampling techniques.

The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable you to answer your research questions. The sample being studied is not representative of the population, but for researchers pursuing qualitative or mixed methods research designs, this is not considered to be a weakness. Rather, it is a choice, the purpose of which varies depending on the type of purposive sampling technique that is used.

In detail, the researcher used Expert sampling which is a sub-case of purposive sampling. Expert sampling involves the assembling of a sample of persons with known or demonstrable experience and expertise in some area. Often, we convene such a sample under the auspices of a "panel of experts." There are actually two reasons you might do expert sampling. First, because it would be the best way to elicit the views of persons who have specific expertise. But the other reason might be expert sampling is to provide evidence for the validity of another sampling approach chosen

3.5 Data collection tools / Instruments

A questionnaire was used as the main tool for collecting data. The selection of this tool was guided by the nature of data to be collected and the time available as the objectives of the study. The researcher used both open ended and closed ended question. The use of open ended questions offers flexibility to the respondents to provide more detail. Closed ended questions allows for quantitative analysis to be done. This balance is useful for comprehensive analysis.

3.6 Instrument validity

Validity is the extent to which a test measures what it is actually intended to measure (Kothari, 2004). Gregory (1992) asserts that in order to be valid, inferences made from scores have to be meaningful, appropriate and useful. Thanasegaran (2009) suggests that theoretical based for construct measurement and accurate operationalisation of constructs can help a researcher achieve measurement validity.

To determine the validity of the questionnaires, the researcher did a pilot study with a group of 10 Engineers identified from the study population.

3.7 Instrument Reliability

Reliability is the extent to which a research tool produces the same results on repeated trials (Miller, n.d). Factors that affect reliability include poor written items, excessively broad content area of measure, imposed time limits in the testing situation, item difficulty, little or no variability in questions within the testing instrument and too many difficult items in the testing instrument (Crocker & Algina, 1986; Mehrens & Lehman, 1991).

From the results of the pilot test, the researcher calculated the Cronbach's alpha for each variable. The Cronbach's coefficient alpha has been advocated as the most widely used in assessing reliability estimates (Crocker & Algina, 1986; DeVellis, 1991; Gregory, 1992; Henson, 2001). Cronbach is a reliability coefficient that measures inter item reliability between variables measuring one concept. It varies from zero to one. Nunally and Bernstein (1994) recommend an acceptable reliability estimate that ranges from 0.70 to 0.80 in the Social Sciences. For this study the cronbach's coefficient alpha was 0.9.

3.8 Data collection procedures

The researcher developed a project proposal under the guidance of the Supervisor. Once the proposal was ready and the study approved by the academic panel, the researcher prepared collection of data process. The researcher sought permission from the Management of Kenya Petroleum Refineries Limited. Once the permission was granted, the researcher collected data.

After constructing the questionnaire, the researcher tried it out on a small sample of the population (Kombo and Tromp, 2011). This is called a pilot study and was done to determine the reliability and validity of the data collection instrument. After piloting and making the necessary amendments, the researcher carried out an evaluation of the revised questions. This included finding out if the questions are clear and specific, where the questions are placed and if the balances of questions are correct (Kombo and Tromp, 2011).

The researchers then administered the questionnaire to the targeted engineers and later collect them thereafter. Once the questionnaires were received, the researchers coded and clean them then feed the data into the Statistical Package for Social Sciences (SPSS). The data then was analysed using frequencies, cross tabulation and one sample hypothesis test also done.

3.9 Data presentation and analysis techniques

This study sought to establish the extent to which the independent variables influenced the dependent variable. It was therefore suitable to analyse data using descriptive analysis. Descriptive analysis is the study of the distribution of one variable and it provides the researcher with profiles of the study population such as their size, composition, efficiency, preferences and so on (Kothari, 2004).

After the data had been coded, it was being fed into the SPSS program which was used to generate various statistical measures. Inferential statistics formed the basis from which the researcher could draw conclusions. Specifically, the researcher used the one sample hypothesis test (t-test) for testing the hypotheses and the relevant correlation coefficients were also used to make inferences.

In this survey there were four hypotheses which were all tested. Those hypotheses were tested using hypothesis test about a mean (t-test) as indicated above, after feeding data into the SPSS program. Here the two-tailed P-value was found. But since we were conducting a one tailed test, the P-value found was divided by two. Whether or not you reject the null hypothesis depends on the level of significance of the test.

3.10 Ethical Considerations

According to Streubert and Carpenter (1999), a new set of ethical considerations is applicable when a qualitative approach is followed. However, the same ethical principles must be observed by researchers when conducting research in a responsible and ethical way. The first ethical principle to consider is the principle of autonomy, which implies

the right to self-determination and the right to full disclosure (Polit & Hungler, 1999). The principle of self-determination means that participants have the right to decide voluntarily if they want to participate in the study or to terminate their participation, therefore the researcher as to obtain informed consent before conducting the research. The participants in this study were informed about the nature of the study and what would become of the findings once the study has been completed. Participants were also be informed and reminded throughout the study their participation was voluntary.

The second and third ethical principles to be considered are the principles of beneficence and justice, which refer to the duty of the researcher to do good and be fair to participants. No names were linked to any responses. Subsequent to data analysis and publication of the research report, all the documents were destroyed by the researcher. Streubert and Carpenter (1999) also point out that the interpretation of data and reporting of findings also require the researcher to follow ethical guidelines.

3.11 Operational definition of variables

Table 3.1: *Operationalisation Table*

Research Objectives	Type of Variable	Indicators	Measure	Level of Scale	Research Design	Data collection Method	Level of Analysis
	Independent Variables						
To establish the extent to which design choice of a particular project influences the construction project performance.	Project design choice	-Life cycle cost -Project cost -Schedule -Procurements approach	-Number -Time	Nominal Scale	Survey	Questionnaire	Descriptive: Percentages Inferential: t-test,
To find out the influence of bid	Bid Invitation	-Bids invitation letters to the	Number	Nominal	Survey	Questionnaire	Descriptive: Percentages

Invitation and evaluation on construction project performance.	and evaluation	contractors -Bid price, technical competence, Management capability, Earlier experience, reference objects, Financial stability		Scale			Inferential: t-test,
To assess the influence of compensation form on construction projects performance.	Compensation form	-Payment through fix Price. -Payment through cost reimbursement	Number	Nominal Scale	Survey	Questionnaire	Descriptive: Percentages Inferential: t-test,
To evaluate the actual performance of the construction project after following the procurement procedures.	Performance Evaluation	Cost Time Quality Satisfaction	Number	Nominal Scale	Survey	Questionnaire	Descriptive: Percentages Inferential: t-test,

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the results of data analysis and interpretation thereof. Data from all the objectives have been analysed into details and the hypothesis analysed too.

4.2 Response rate/ Questionnaire return rate

In this section the responses of the respondents on the questionnaires have been analysed and the result given.

4.2.1 Response to questionnaire.

One questionnaire was used for this study and table 4.1 shows the response rate of the questionnaire.

Table 4.1: *Response rate*

Respondent Category	Sample size (No.)	Questionnaires Sent (No.)	Questionnaires Received (No.)	Response rate (%)
Engineers	30	30	29	96.67
Procurement Personnel	15	15	13	86.67
Combined Engineers and Procurement Personnel	45	45	42	93.33

From table 4.1, the combined response rate is 93.33%. It should be noted that 3 questionnaires were not returned and the remaining is deemed to be sufficient for the statistical analysis.

4.2.2 Response Rate.

The following steps were taken in order to improve the response rate.

1. The respondents were assured of anonymity
2. The cover letter made a humane appeal to the respondents
3. The length of the questionnaire was kept to a minimum for this study, and
4. Phone calls were constantly made to remind respondents about completing the questionnaire.

4.3 Demographic characteristics of respondent

This section describes the demographics of the respondents surveyed in this research. It reveals their experience, expertise, age, the kind of organisation they work for and their status.

4.3.1 Respondents' age

From the results, the respondents that are over the age of thirty predominate in the sample investigated. This group of respondents constitutes 90.5%. Respondents between the age of twenty-five and thirty constitute 9.5%. It can be concluded that respondents that make up the survey sample are mature, have a high probability of being responsible, and sufficiently experienced.

4.3.2 Respondents' years of experience

The mean number of respondents' years of experience is 14 (Table 4.2). Any respondent with 14 years of experience is considered to be knowledgeable in his / her discipline, therefore the data obtained from these respondents can be deemed to be reliable.

Table 4.2: *Mean number of respondents' years of experience.*

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Years Of Experience	42	3	26	13.69	6.569
Valid N (listwise)	42				

4.3.3 Respondents' experience on other construction projects

The frequency of respondents' who have had experience on other construction project before this project (Table 4.3). 25 of the respondents have had experience on construction project which is average for such project as we will not be having all new people on the project.

Table 4.3: *Frequency of experience on other construction projects*

Statistics			
		Yes	No
N	Valid	25	17
	Missing	17	25

4.4 Data analysis and presentation as per objectives

This section describes how data is analysed from the respondents surveyed in this research.

4.4.1 Project Design Choice

Regarding the project design choice several questions were asked, but questions 5 and 6 were not analyzed as they were just follow-up questions.

4.4.1.1 Project Complexity

The respondents' were asked how they rate the complexity of the project and this is how they answered.

Table 4.4: *Mean rating of the project complexity*

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Project Complexity	42	1	5	3.19	1.065

Table 4.4 represents the mean of the respondents' rating of the project complexity. From the table it seems that the project was moderate which is supported by the mean of 3.19. This is also supported by frequency table 4.5.

Table 4.5: *Frequency of rating of the project complexity*

	Project Complexity				
	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	1	3	7.1	7.1	
	2	6	14.3	21.4	
	3	18	42.9	64.3	
	4	10	23.8	88.1	
	5	5	11.9	100.0	
	Total	42	100.0	100.0	

Table 4.5 represents the percentage of the respondents who agree that the project complexity was high. The table shows that total 78.6% of the respondents rated the project complexity 3 and above, which means that the project complexity was moderate.

4.4.1.2 Procurement approach Employed for the project

The respondents were asked to indicate the procurement approach employed for the project. Below is how they responded.

Table 4.6: *Frequency of the procurement approach employed*

		Statistics						
		Traditional	Design Build	BOOT	Partnering	Management Contracting	Construction Management	Other Approach
N	Valid	11	4	0	0	13	14	0
	Missing	31	38	42	42	29	28	42

Table 4.6 present the respondents' response on the procurement approach employed. From the table it seems several procurement approaches were used in this project. The norm is that only one single procurement approach needs to be used for the all project and if several are used as in the case, there is high possibility of a lot of confusion which lead to the failure of the project.

4.4.1.3 Rating of how the Project Design choice influences the construction performance

The respondents were asked how the project design choice influences the construction performance on a scale of 1 to 5 on several factors. On all those factors cronbach's alpha determined to be 0.977 as on table 4.7 below. Based upon these, the internal consistency of the data can be deemed reliable.

Table 4.7: *Reliability statistics*

Reliability Statistics	
Cronbach's Alpha	N of Items
.977	6

Table 4.8: *Mean number of respondents rating on how design choice influence project performance*

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Time Performance	42	2	5	3.86	1.117	1.247
Quality Performance	42	1	5	3.69	1.179	1.390
Economical Performance	42	1	5	3.67	1.097	1.203
Environmental Performance	42	1	5	2.83	1.146	1.313

Innovation	42	1	5	2.45	1.194	1.425
Work Performance	42	1	5	2.33	.928	.862
Valid N (listwise)	42					

Table 4.8 presents the respondents' rating of the influence of project design choice in terms of various factors on project performance. It is notable that all factors in the category have $MSs > 2.33 < 3.9$, which indicates that the factors have between a near minor to moderate / moderate influence on the project performance.

The factors which are the most significant are the time performance, followed by quality and economical performance. All of those factors may lead to a substantial poor performance of the project, which may culminate in the failure of the project. The least significant factor is the work performance and innovation. In the construction industry, innovation and work performance are the problem of that contractor.

4.4.2 Bid Invitation and Evaluation

In this section, the respondents were asked questions to find out how bid invitation and evaluation influences the construction project performance.

4.4.2.1 Bid Structure

The respondents were asked how the bid was structured and 66.7% explained that there were multiple bids while 19% said there was a single bid and 14.3% didn't know how the bid was structured. This is shown on table 4.9 below. The norm on such a big project, the bid structure is always recommended to be multiple.

Table 4.9: *Frequency of the bid structure*

		Bid Structure			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	8	19.0	19.0	19.0
	Multiple	28	66.7	66.7	85.7
	Don't know	6	14.3	14.3	100.0
	Total	42	100.0	100.0	

4.4.2.2 Type of companies

Table 4.10 shows the frequency of the types of the companies invited in the bid and from the respondents results 40.5% were international and 59.5% local. Several companies were invited both locally and internationally which is good for such big construction project.

Table 4.10: *Frequency of the type of companies*

Type of companies					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Local	25	59.5	59.5	59.5
	International	17	40.5	40.5	100.0
	Total	42	100.0	100.0	

4.4.2.3 Experience of the Bidders

Table 4.11 shows the frequency of the bidders' years of experience which is a factor which is used when selecting the bidders. 33 respondents said that 47.6% of bidders had experience less than 5 years and 31% had experience between 5 and 10 years. That is to say that the bidders had very few years of experience on construction project. For a construction project to succeed, the bidders must have more than 10 years experience on construction on this magnitude.

Table 4.11: *Frequency of the bidders' years of experience*

Experience of Bidders					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	3	7.1	7.1	7.1
	Less than 5 years	20	47.6	47.6	54.8
	5-10 years	13	31.0	31.0	85.7
	10-20 years	4	9.5	9.5	95.2
	More than 20 years	2	4.8	4.8	100.0
	Total	42	100.0	100.0	

4.4.2.4 Factors which influence the choice of a construction bidder.

Table 4.12 shows descriptive statistics of the respondents' response on factors which need to be looked into when selecting a construction bidder or contractor. It is noted that all those factors have MSs $> 3.14 < 4.4$, which indicates that the factors are all moderate and enhance they are all important for the selection of contractor. Before selection of the contractor/bidder, these entire factors have to be analysed well.

Table 4.12: Mean numbers of respondents' factors affecting the selection of a bidder.

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Bid Price	42	2	5	4.07	.894
Technical Competence	42	2	5	4.38	.854
Management Capability	42	2	5	4.07	.838
Earlier Experience	42	2	5	4.17	1.010
Reference Objects	42	2	5	3.79	.925
Environmental QMS	42	1	5	3.14	1.160
Financial Stability	42	1	5	3.93	1.022
Collaborative Skills	42	1	5	3.52	.994
Valid N (listwise)	42				

4.4.2.5 Rating of how the Bid invitation and evaluation influences the construction project performance.

The respondents were asked how the bid invitation and evaluation influences the construction performance on a scale of 1 to 5 on several factors. On all those factors cronbach's alpha determined to be 0.958, as on table 4.13 below. Based upon these, the internal consistency of the data can be deemed reliable.

Table 4.13: *Reliability statistics*

Reliability Statistics	
Cronbach's Alpha	N of Items
.958	6

Table 4.14: *Mean numbers of respondents' rating of how bid invitation and evaluation influence the project performance.*

Descriptive Statistics							
Factors	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Rank
Economical Performance	42	3	5	4.43	.703	.495	1
Time Performance	42	3	5	4.29	.596	.355	2
Quality Performance	42	2	5	4.29	.742	.551	2
Work Performance	42	1	5	3.07	1.156	1.336	4
Environmental Performance	42	1	5	2.81	1.065	1.134	5
Innovation	42	1	5	2.26	.964	.930	6
Valid N (listwise)	42						

Table 4.14 presents the respondents' rating of the influence of bid invitation and evaluation in terms of various factors on project performance. It is notable that all factors in the category have $MSs > 2.26 < 4.5$, which indicates that the factors have between a near minor to moderate / moderate influence on the project performance.

The factors which are the most significant are the economical performance, followed by time and quality performance. All of those factors may lead to a substantial poor performance of the project, which may culminate in the failure of the project. The least significant factor is the environmental performance and innovation. In the construction industry, innovation and work performance are the problem of contractor.

4.4.3 Compensation Form

In this section, the respondents were asked questions to find out how compensation form (payment form) influences the construction project performance.

4.4.3.1 Payment form

Table 4.15 represents the respondents' answer of how the contracts payment was done. Most of the contracts 59.5% were paid through fixed price and 40.5% were paid through cost reimbursement.

Table 4.15: *Frequency numbers of the respondents' ways of payment.*

Contract Payment Method					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cost reimbursement	17	40.5	40.5	40.5
	Fixed Price	25	59.5	59.5	100.0
	Total	42	100.0	100.0	

4.4.3.2 Rating of how compensation form influence construction project performance

The respondents were asked how the compensation form influences the construction project performance on a scale of 1 to 5 on several factors. On all those factors cronbach's alpha determined to be 0.953 as shown on table 4.16 below. Based upon these, the internal consistency of the data can be deemed reliable.

Table 4.16: *Reliability statistics*

Cronbach's Alpha	N of Items
.953	6

Table 4.17: Mean numbers of respondents' rating of how Compensation forms influences the project performance.

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Deviation	Rank
Economical Performance	42	1	5	4.31	1.024	1
Time Performance	42	3	5	3.98	.643	2
Quality Performance	42	2	5	3.76	.759	3
Environ Performance	42	2	5	2.93	.640	4
Work Environment	42	1	4	2.12	.670	5
Innovation	42	1	4	2.02	.780	6
Valid N (listwise)	42					

Table 4.17 presents the respondents' rating of the influence of compensation form terms of various factors on project performance. It is notable that all factors in the category have MSs $> 2.02 < 4.4$, which indicates that the factors have between a near minor to moderate / moderate influence on the project performance.

The factors which are the most significant are the economical performance, followed by time and quality performance. All of those factors may lead to a substantial poor performance of the project, which may culminate in the failure of the project. The least significant factor is the environmental performance and innovation. In the construction industry, innovation and work performance are the problem of contractor.

4.4.4 Project Performance Evaluation

In this section, the respondents were asked questions in order to evaluate the entire project performance in relation to the requirement of the client.

a) Cost: Factors accounting for the difference between the final cost and contract price.

Table 4.18 presents the frequency of respondents' on factors accounting for the difference between the final cost and contract price. The cost difference was due to variations 50%, poor project management 33.3% and estimation errors 14.3%.

Table 4.18: *Frequency of number of respondents' factors accounting for the difference between the final cost and contract price.*

		Factors			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Variations	21	50.0	50.0	50.0
	Estimation Errors	6	14.3	14.3	64.3
	Rework	1	2.4	2.4	66.7
	Poor Project Management	14	33.3	33.3	100.0
	Total	42	100.0	100.0	

Cost: Types of Variations encountered.

Table 4.19 presents the frequency of respondents' types of variations encountered when undertaking the construction project. There were two types of variations, contract variation 69% and design variations 31%. Those were the main sources of cost variation in this project.

Table 4.19: *Frequency of Types of variations encountered*

		Variations			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Contract	29	69.0	69.0	69.0
	Design	13	31.0	31.0	100.0
	Total	42	100.0	100.0	

b) Time: Factors accounting for the difference between the actual and proposed duration

Table 4.20 presents the frequency of respondents on factors accounting for the difference between the actual and proposed project completion duration. This project was late to be completed due to variations 50% and poor project management 33.3% as shown on this table. As it is in most construction project, if care is not taken on those two factors, the project may fail.

Table 4.20: *Frequency of factors accounting for the difference between the actual and proposed duration*

		Factors			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Variations	21	50.0	50.0	50.0
	Estimation Errors	6	14.3	14.3	64.3
	Rework	1	2.4	2.4	66.7
	Poor Project Management	14	33.3	33.3	100.0
	Total	42	100.0	100.0	

c) Quality: The extent to which the project was free from apparent defects

Table 4.21 presents the frequency respondents' on the quality of the project. This table explained that 92.9% agreed that the entire project was free from defects.

Table 4.21: *Frequency of Defects*

		Quality			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	The project was free from defects	39	92.9	92.9	92.9
	Don't Know	3	7.1	7.1	100.0
	Total	42	100.0	100.0	

d) Satisfaction

The respondents were asked whether the client were satisfied with the construction project on a scale of 1 to 5 on several factors. On all those factors cronbach's alpha determined to be 0.909 as shown on table 4.22 below. Based upon these, the internal consistency of the data can be deemed reliable.

Table 4.22: *Reliability statistics*

Reliability Statistics	
Cronbach's Alpha	N of Items
.909	4

Table 4.23: *Means number of respondents' rating Client satisfaction*

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Deviation	Rank
Service	42	2	5	3.14	.783	1
Quality	42	2	5	3.14	.566	1
Time	42	1	3	1.90	.532	3
Cost	42	1	3	1.62	.582	4
Valid N (listwise)	42					

Table 4.23 presents the respondents' rating of the client satisfaction in terms of various factors. It is notable that all factors in the category have MSs > 1.62 < 3.2, which indicates that the factors have between a near minor to moderate / moderate influence on the client satisfaction.

The factors which are the most significant are the service and quality followed by time and cost performance. All of those factors may lead to a substantial poor performance of the project, which may culminate in the failure of the project. The least significant factor are cost and time which were poorly done as by the results above.

4.4.5 Testing Hypotheses

Table 4.24 provides the results of the t-test test of means conducted on the hypotheses. Information such as the valid numbers used, the means, standard deviations, the t-values, and p-values are presented, which were obtained for the various hypotheses and are later analysed.

Table 4.24: *Summary of t-tests conducted on the hypotheses*

Null hypotheses	Test of means against reference constant (Value)				
	Valid Numbers	Mean	Standard deviation	t-value	p-value
Project design selection does not significantly influence the construction project performance.	42	3.33	1.183	1.827	0.0375
The bid invitation and evaluation does not significantly influence the construction project performance.	42	3.64	1.032	4.038	0.000
The compensation form does not significantly influence the outcome of the construction project performance.	42	3.76	0.906	5.453	0.000
The construction project did not significantly perform					

well as per the expectation	42	2.64	1.100	-2.103	0.021
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The t-test was conducted for the four hypotheses. The following are the conditions governing the testing.

The significance level $\alpha = 5\%$ (0.05), and

The confidence level is at 95%.

Null (μ) = 3 and alternative $\mu > 3$, where $\mu = \text{mean} = 3$.

First Hypotheses

Table 4.25: *Results of the t-test of design choice*

One-Sample Test						
Test Value = 3.0						
	t	df	Sig. (2- tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Effect of Design Choice	1.827	41	.075	.333	-.04	.70

Table 4.25 above shows the results of the t-test of design choice on construction project performance.

The null hypothesis states that:

H_0 : Project design selection does not significantly influence the construction project performance.

The alternative hypothesis states that:

H_1 : Project design selection significantly influences the construction project performance.

If $p\text{-value} < 0.05$, then H_0 is rejected, but $p\text{-value} = 0.075/2 = 0.0375$ since we have conducted a one-tailed test.

Therefore, H_1 the Project design selection significantly influence the construction project performance is supported since $p < 0.05$.

Second Hypotheses

Table 4.26: Results of the t-test of influence of bid invitation and evaluation

One-Sample Test						
Test Value = 3.0						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Effect Of Bid Invitation and Evaluation	4.038	41	.000	.643	.32	.96

Table 4.26 above shows the results of the t-test of influence of bid invitation and evaluation on construction project performance.

The null hypothesis states that:

H_0 : The bid invitation and evaluation does not significantly influence the construction project performance.

The alternative hypothesis states that:

H_1 : The bid invitation and evaluation does significantly influence the construction project performance.

If $p - \text{value} < 0.05$, then H_0 is rejected, but $p - \text{value} = 0.00$

Therefore, H_1 the bid invitation and evaluation significantly does influence the construction project performance is supported since $p < 0.05$.

Third Hypothesis

Table 4.27: Results of the t-test of the influence of compensation form

One-Sample Test						
Test Value = 3.0						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Effect Of Compensation form	5.453	41	.000	.762	.48	1.04

Table 4.27 above shows the results of the t-test of the influence of compensation form on construction project performance.

The null hypothesis states that:

H_0 : The compensation form does not significantly influence the outcome of the construction project performance.

The alternative hypothesis states that:

H_1 : The compensation form does significantly influence the outcome of the construction project performance.

If $p - \text{value} < 0.05$, then H_0 is rejected, but $p - \text{value} = 0.00$

Therefore, H_1 the compensation form does significantly influence the outcome of the construction project performance is supported since $p < 0.05$.

Fourth Hypothesis

Table 4.28: Results of the t-test of the overall performance of the project

One-Sample Test						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Overroll Performance Of Project	-2.103	41	.042	-.357	-.70	-.01

Table 4.28 above shows the results of the t-test of the overall performance of the project.

The null hypothesis states that:

H_0 : The construction project did not significantly perform well as per the expectation.

The alternative hypothesis states that:

H_1 : The construction project did significantly perform well as per the expectation.

If $p - \text{value} < 0.05$, then H_0 is rejected, but $p - \text{value} = 0.021$

Therefore, H_1 the construction project did significantly perform well as per the expectation is supported since $p < 0.05$.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATION

5.1 Introduction

This chapter summarizes the findings of the study based on the four stated objectives of the study. In each case, the researcher briefly states the findings and the general implication they have towards the construction project performance in Mombasa. At the end the researcher states recommendations and highlights areas that need further research.

5.2 Summary of Findings

This study investigate the influence of procurement procedures on construction project performance in Mombasa at Kenya Petroleum Refineries limited (KPRL). The findings on the four objectives are outlined below.

From the data analysed from the respondents, the complexity of the project was found to be medium, as this was supported by mean value of 3.19 while scoring out of 5. In terms of the procurement approach employed in this project, the survey found out that a number of approaches were used contrary to norm, where only one procurement approach is selected and used. It was also found that project design choice influences the construction project performance as all the factor had means rating of MSs $> 2.33 < 3.9$. This is to say that all those factors have to perform well for the project to perform well.

It was found that the project was structured to have multiple bids for sections of the project as opposed to the norm where the bid is done for the whole project. Most of the companies invited were both local and internationally. But the companies had less than 10 years experience in construction projects. When doing the evaluation, it was found out that all the factors were important as it is supported by the MSs $> 3.14 < 4.4$, which is above moderate.

In this project, both cost reimbursement and fixed price methods were used for payment of the contractors. The way a contract is paid, really affect the project performance as it is supported by means of the factor which is $MSs > 2.02 < 4.4$, which is minor to moderate influence on the project performance.

The initial cost of the project was \$ 15 million and the final cost was \$ 17.5 million plus \$1.2 million more to connect the project to the grid. This is a variance of \$ 3.5 million which was mainly due to contracts variations and poor project management. The project had initial plan to take 12months but it ended up taking 19 months.

It was also found that the project was free from defects, but the client was not satisfied with the cost part and time taken for the whole project. They were satisfied with the quality and the services of the project as it is supported by factors (quality and services) in the category have $MSs = 3.14$, which indicates that the factors have between a near minor to moderate / moderate influence on the client satisfaction.

5.3 Discussion of Key Findings

The first objective was to establish the extent to which design choice of a particular project influences the construction project performance. A number of indicators namely project life cost, project complexity, project cost, schedule and procurement approach were used to test the influence on construction performance. Data was obtained from questionnaire responses, analysed and hypothesis tested about a mean.

It was found that a number of procurement approaches namely traditional, management contracting, construction management and design build were used instead of using only one approach. This always resulted to confusion during the project execution. This result agree with Andi and Minato, 2003, who says that, defective design has been found to cause 30% of cost and time overruns in construction projects.

The second objective was to find out the influence of bid Invitation and evaluation on construction project performance. A number of indicator were used, some of which are

bid invitation letters, bid price, technical competence, earlier experience and financial stability of the bidders. Data were also obtained from questionnaire responses, analysed and hypothesis tested about a mean. From those results it was found out that for each bid, three invitation letters was sent to the bidders. It was also found that 47.6% of the respondents said that the bidder has less than 5 years experience on construction projects and 31% of the respondents said that the bidder had between 5-10 years experience on construction projects. This result spelled doom for the construction project because if you have contractors who have less the 5 years experience, there is very high possibility of the project taking longer than expected or even fail as they don't have enough experience for the task. The cost of the project may also go up.

The third objective was to assess the influence of compensation form on construction projects performance. There were two indicators namely fix price and cost reimbursement. From the respondents, it was found out that 59.5% used cost reimbursement and 40.5% used fix price. This shows that both the payment methods were favoured depending on the task.

Finally the fourth objective was to evaluate the actual performance of the construction project after following the procurement procedures. There were four indicators namely cost, time, quality and client satisfaction. The project cost increased by 16.82%, for \$15,000,000.00 to \$17,523,123.00 for the completion and still require an additional of \$1,200,000.00 so that the project can be fully operational. The completion time increase by 58.3%, from 12 months to 19 months. In terms of satisfaction, the client was not satisfied with the cost and time taken but was satisfied with the service and the quality of the project.

5.4 Conclusions

Based on the results, it was not possible to understand which type of procurement approach was used in this project, as the respondents gave three approaches which they said was used. Looking at the results again, it was realized that the companies who bided and executed the project had experience of less than 5 years. This is not good for the

project of this magnitude. The companies which needed to be allowed to bid need to have had experience of not less than 10 years on projects of similar size or bigger.

The other important things which come out clearly was that when selecting bidders or contractors, all factors namely bid price, management capability, earlier experience, reference objects, environmental QMS, financial stability and collaborative skills are all important.

From the results, it was realized that project performance depends also on the way the payments are done to the contractors or bidders.

This project had cost and time variances, which are always found in most of construction project in the world. Researchers and organisations have focused on the four projects performance criteria of cost, time and quality (Chan and Chan, 2004, Swan and Khalfan, 2007) and customer satisfaction (Chan and Chan, 2004,). This was also proven by the results from the respondents' on client satisfaction.

The Project design selection does significantly influence the construction project performance. The factors associated with this indicate that they support the hypothesis. It can be argued that, base upon the result, respondents are of the opinion that for the construction project to perform as expected, the design need to be analysed by experience consultants and that project design selection can give you an indication whether the project will fail or succeed. This agrees with the fact that, defective design has been found to cause 30% of cost and time overruns in construction projects (Andi and Minato, 2003).

The bid invitation and evaluation does significantly influence the construction project performance. From the result of the test, it is indicted that factors identified in this category support the hypothesis. The reason that could be attributed to this is, the process of bid invitation and evaluation is a complex and a lengthy one and once this process is not done well, it can lead to the construction project failure.

The compensation form does significantly influence the outcome of the construction project performance. From the result of the analysis it is indicated that the associated factors identified in the study, does significantly influence the construction project performance. This may be attributable to the method of paying the contract and how fast it is done. If the payment is done fast, the project will perform as required.

The construction project did significantly perform well as per the expectation. Based upon the result of the analysis, it indicates that mean from the respondents is 2.64. This may be as a results good performance on service provided and the quality of the service toward the project.

5.6 Recommendations

Following the findings of this study, the researcher recommends the following suggestions that will help the management of Kenya Petroleum Refineries limited to improve the management of construction projects.

The study found out that more than one procurement choice was used. The researcher recommends that before procuring a construction project, the company should study a project and decide on only one procurement method to be used.

Secondly the study established that 78.6% of the companies involved in the project had experience of 5years and less. The researcher recommends that for better results, the contractors/bidders involved in construction need to have 10 years and above before been engaged in a project of such magnitude.

Thirdly the study established that both type of payment namely cost reimbursement and fixed price were used in the project. The researcher recommends that only one payment method namely cost reimbursement should be used for entire project, this decreasing the financial risk for the contractor (Korczynski, 1996) and hence improve the completion time of the project.

Fourth the study revealed that cost variation was due to contract cost variation and poor project management. The researcher recommends all the personnel involved with projects should be taken for project management and contract management training.

Lastly the study revealed that the client satisfaction level on the cost and time was very low. The researcher also recommends the evaluation of contractors/bidders' technical and financial performance before engaging them on a project. This will result in a better understanding of the contractors' overall capabilities.

5.7 Suggestions for further studies

The following studies are recommended to be undertaken in Kenya:

3. A comparative study of the effect of cost variation on construction project performance;
4. A comparative study of the effect of contract variation on project timeline

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APPENDICES

Appendix I: Letter of Transmittal

Cover letter of questionnaire survey

To Whom It May Concern:

Dear Sir or Madam,

An investigation of the influence of procurement procedures on the construction project performance

We would like to invite your participation in this research study which seeks to deepen understanding of procurement procedures and the role it plays in determining construction project performance.

We will be very grateful if you can complete the enclosed questionnaire and return it. The questionnaire will require that you recall your experiences on the most recently completed construction project and use that as a basis for responding to the questions. Your contribution will be most invaluable. You are assured that the information obtained from this survey will be kept strictly CONFIDENTIAL and used for research purposes only. Upon request, you will receive a copy of a report detailing the results of this research.

If you require any further information or clarification, we will be pleased to answer your questions. Contact details are provided below. Alternatively you may wish to make assumptions on any matters that are unclear to you.

We do appreciate that the questionnaire will take some of your valuable time. However, without your kind and expert input the ambitions of this research project will not be realised. It is our hope therefore that you will be able to assist us in this research by completing and returning the enclosed questionnaire.

Thanking you in anticipation.

Yours Sincerely,

Amos .O. Oloo

Research Student

University of Nairobi.

Appendix II: Questionnaire Survey

Questionnaire Survey

Section A General information (Optional)

Name of respondent:	
Position of respondent:	
Name of Company:	
Address:	
Telephone:	E-mail:

Section B Procurement procedures

Please provide a description of the power project which was recently completed and you were personally involved, by providing appropriate answers to the questions below.

Personal					
1. Have you worked on other construction projects prior to this project? Yes <input type="checkbox"/> No <input type="checkbox"/>					
2. Please indicate your age (Please tick)					
Under 25 <input type="checkbox"/> 25-30 <input type="checkbox"/> 31-40 <input type="checkbox"/> 41-50 <input type="checkbox"/> Over 50 Years <input type="checkbox"/>					
3. Please indicate your actual years of experience _____					
Project Design Choice					
		Very			Very
		Simple			Complex
4. How would you rate the complexity of this project?	1	2	3	4	5
5. What was the contract price?	_____				
6. What was the proposed project duration?	_____				
7. Please indicate the procurement approach employed for this project (Please tick)					
Traditional lump sum competitive tendering <input type="checkbox"/>					

Design & Build	<input type="checkbox"/>
BOOT	<input type="checkbox"/>
Partnering	<input type="checkbox"/>
Management Contracting	<input type="checkbox"/>
Construction Management	<input type="checkbox"/>
Other approach (please specify)	_____

8. On a scale of 1(Minor) to 5(Major) , rate how the Project design choice influences the construction project performance based on the following Factors(Please tick)

Effect of Project design choice	1	2	3	4	5
Economical performance	1	2	3	4	5
Time Performance	1	2	3	4	5
Quality Performance	1	2	3	4	5
Environmental performance	1	2	3	4	5
Work Environment	1	2	3	4	5
Innovation	1	2	3	4	5

Bid Invitation and Evaluation

9. How were the bid structured? (Please Tick)

Single bid for the all project

Multiple bids for sections of the project

Don't know

10. If it was single bid, what was the number of bid invitation letters? 1 2 3 4 5

11. If it was multiple bids, what was the number of bid invitation letters for each section? (Tick)

1 2 3 4 5

12. To which type of companies were the letters sent? (Please tick)					
Local <input type="checkbox"/>		Internationally <input type="checkbox"/>			
13. What is the bid price? _____					
14. How many years of experience do the bidder company have? (please tick)					
0 <input type="checkbox"/>	Less than 5 <input type="checkbox"/>	5-10 <input type="checkbox"/>	10-20 <input type="checkbox"/>	More than 20 <input type="checkbox"/>	
15. For each of the following factors, indicate how much influence they had on the evaluation and selection of the bidder on the construction project?					
	Low Influence			High Influence	
Bid price	1	2	3	4	5
Technical competence	1	2	3	4	5
Management Capability	1	2	3	4	5
Earlier experience	1	2	3	4	5
Reference objects	1	2	3	4	5
Environmental and quality management system	1	2	3	4	5
Financial Stability	1	2	3	4	5
Collaborative skills	1	2	3	4	5
16. On a scale of 1(Minor) to 5(Major) , rate how the Bid invitation and Evaluation influences the construction project performance based on the following Factors (Please tick)					
Effect of Bid Invitation & Evaluation	1	2	3	4	5
Economical performance	1	2	3	4	5
Time Performance	1	2	3	4	5
Quality Performance	1	2	3	4	5
Environmental performance	1	2	3	4	5
Work Environment	1	2	3	4	5

Innovation	1	2	3	4	5
Compensation form (Payment)					
17. How was the contract paid?(Please tick)					
Cost reimbursement	<input type="checkbox"/>	Fixed price	<input type="checkbox"/>		
18. On a scale of 1(Minor) to 5(Major) , rate how the Compensation form influences the construction project performance based on the following Factors (Please tick)					
Effect of Compensation Form	1	2	3	4	5
Economical performance	1	2	3	4	5
Time Performance	1	2	3	4	5
Quality Performance	1	2	3	4	5
Environmental performance	1	2	3	4	5
Work Environment	1	2	3	4	5
Innovation	1	2	3	4	5
Construction Project Performance Evaluation					
Cost					
19. What was the final cost of the project? _____					
20. What factors accounted for the difference between the final cost and contract price?					
Variations	<input type="checkbox"/>	Estimation Errors	<input type="checkbox"/>	Reworking	<input type="checkbox"/>
Poor project management	<input type="checkbox"/>	Others (Please specify) _____			
21. What types of variations were encountered?					
Contract Variations	<input type="checkbox"/>	Design Variation	<input type="checkbox"/>		
Time					
22. How long did it take to complete the project?_____					
23. What factors account for the difference between the actual and proposed duration?					
Variations	<input type="checkbox"/>	Estimation Errors	<input type="checkbox"/>	Reworking	<input type="checkbox"/>
Poor project management	<input type="checkbox"/>				

Others (Please specify) _____

Quality

24. At the time of handover, to what extent was project free from apparent defects? (please tick)

- The project was free from defects
- There were a few defects but the project handed over on time
- There were one or more defects that delayed handover slightly – by how many weeks?
- There were major defects which delayed handover substantially - by how many weeks?
- Don't know

Satisfaction

Very dissatisfied

Very satisfied

25. In your opinion, how satisfied was the client with:

a. Service	1	2	3	4	5
b. Cost	1	2	3	4	5
c. Time	1	2	3	4	5
d. Quality	1	2	3	4	5

26. On a scale of 1(Minor) to 5(Major), how will you rate the performance of this project?

1 2 3 4 5