

**FACTORS INFLUENCING THE EFFECTIVENESS OF IMPLEMENTATION OF  
THE ECONOMIC STIMULUS PROGRAMME (ESP), THE CASE OF  
CONSTRUCTION PROJECTS IN NAIROBI COUNTY, KENYA**

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## DECLARATION

This Research Project is my original work and has not been submitted for an award in this or any other university.

Signature í í í í í í í í í í í

Date í í í í í í í í í í

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This Research Project Report is submitted for examination with my approval as the University Supervisor.

Signature í í í í í í í í í í í í Date í í í í í í í í

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## **DEDICATION**

This Research Project Report is dedicated to my wife, Damaris, for her patience and all the support she has offered me.

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2.9 Project Cost Control	15
2.9.1 Estimate Costs	15
2.9.2 Project Budget	16
2.9.3 Cost Control Tools	16
2.10 Project Scheduling	17
2.10.1 Project Scheduling Techniques	17
2.10.1.1 Narrative Scheduling	17
2.10.1.2 Gantt Chart or Bar Chart	18
2.10.1.3 Linear Scheduling Method (LSM)	18
2.10.1.4 Critical Path Method Schedules (CPM)	19
2.10.1.5 Program Evaluation and Review Technique (PERT)	19
2.11 Summary of Literature Review	20
2.12 Study gap to be filled	20
2.13 Conceptual Framework	21
2.13.1 Relationship between variables	23
2.13.1.1 Changes in construction designs	23
2.13.1.2 Contractors Selection Process	23
2.13.1.3 Project Funding Levels	23
2.13.1.4 Project Cost control	24
2.13.1.5 Project Scheduling	24

**CHAPTER THREE: RESEARCH METHODOLOGY.....25**

3.1 Introduction	25
3.2 Research Design	25
3.3 Target Population	25
3.4 Sampling and Sampling Procedures	26
3.4.1 Sample Size	26
3.4.2 Sampling Techniques	27
3.5 Data Collection Instruments	27
3.5.1 Piloting of Instruments	28
3.5.2 Validity of the Instruments	28

3.5.3 Reliability of the Research Instrumentí ..28

3.6 Data Collection Proceduresí .. ...29

3.7 Data Analysis Techniquesí 29

3.8 Ethical Considerationsí .....29

**CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION.....32**

4.0 Introductioní 32

4.1 Response rate of the studyí .....32

4.2 Background of the respondentsí ..33

4.2.1 Gender profile of the respondentsí ..33

4.2.2 Highest education levelí .....34

4.2.3 Age of respondentsí 35

4.2.4 Classification of respondentsí 36

4.2.5 Cross tabulation of classification of respondents and highest education levelí í í í í í .37

4.3 Presentation of analysis according to research questionsí í í í í í í í í í í í í í í í í ..38

4.3.1 Influence of changes in construction designs on effectiveness of implementation of  
Construction projectsí .39

4.3.2 Reasons for Changes in Construction Designsí ..39

4.3.3 Effect of changes in construction designs on effective construction project  
Implementationí .....40

4.4 Influence of Contractors Selection process on effectiveness of Implementation  
Construction projectsí .41

4.4.1 The process of Tender Evaluationsí ...41

4.4.2 Factors determining the selection of a contractor in a construction projectí í í í í í í ..42

4.5 Project Funding Levelsí .í í .43

4.5.1 Project funding as a critical factor in effective construction project implementationí í í ...44

4.5.2 Funding Levels impact on project implementationí í í í í í í í í í í í í í í í í í ..44

4.6. Project Cost Controlí .....45

4.6.1 Preparation of accurate project costsí .46

4.6.2 Preparation of Budgets for construction projectsí ..46







Table: 4.18 Project Cost Control Impact on Project Implementation í í í í í í í í í í í .50

Table: 4.19 Project Duration Estimation í 51

Table: 4.20 Project Scheduling Tools and Techniques í í í í í í í í í í í í í í í í 52

Table: 4.21 Project Scheduling Influence on Project Implementation í í í í í í í í í í .53

Table: 4.22 Analysis of Influences of Study Variables on Effectiveness of Implementation of  
Construction Projects í 55

## LIST OF FIGURES

Page

Figure 1: Gantt chart or Bar chartí .18

Figure 2: Conceptual Frameworkí ..22

## **ABBREVIATIONS AND ACRONYMS**

ESP	Economic Stimulus Programme
ICT	Information and Computer Technology
GDP	Gross Domestic Product
PEV	Post Election Violence
MOPW	Ministry of Public Works
RFP	Request for Proposal
CPM	Critical Path Method
PERT	Program Evaluation and Review Technique
CIDC	Constituency Industrial Development Centre
RII	Relative Importance Index

## ABSTRACT

The purpose of the study was to identify factors influencing effectiveness of implementation of economic stimulus programme, the case of construction projects in Nairobi County. The objectives of the study were to establish the influence of changes in construction designs on the effectiveness of implementation of economic stimulus programme, to determine the influence of selection of contractors process on the effectiveness of implementation of economic stimulus programme, to assess the influence of project funding levels on the effectiveness of implementation of economic stimulus programme, to establish the influence of cost control models on the effectiveness of implementation of economic stimulus programme and to find out the influence of project scheduling models on the effectiveness of implementation of economic stimulus programme. The methodology used was literature review and field study. The field survey employed self administered questionnaire instrument as well as simple random sampling. The study used quantitative research methodology and employed field survey design as well as literature review. Thirty seven number questionnaires were distributed to clients, consultants and contractors randomly selected from thirty seven projects that were sampled and thirty six responded. The field survey confirmed that changes in construction designs, selection process of contractors, project funding levels, project cost control and project scheduling all have influence on effectiveness on implementation of construction projects. Analysis of relative importance index revealed that project cost control had the highest influence followed by project funding levels. Project scheduling, contractors selection process and finally changes in construction designs followed in that order of importance. The recommendations include accurate project estimates should be done at the initiation of the project. Project cost control i.e. preparation of project budgets, variance analysis and financial appraisals should be carried out regularly throughout the project cycle. The clients should also ensure the project is adequately funded up to completion to avoid cash flow and liquidity challenges.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the study

The Kenya Economic Stimulus Program (ESP) was initiated by the Government of Kenya to boost economic growth and lead the Kenyan economy out of a recession situation brought about by economic slowdown. Its aim was to jumpstart the Kenyan economy towards long term growth and development, after the 2007-2008 Post Election Violence that affected the Kenyan economy, prolonged drought, a rally in oil and prices and the effects of the global economic crises.

Between 2003 ó 2007, the Kenyan Economy was growing quite fast. However, due to government corruption scandals and political unrest which resulted in the 2008 Post Election Violence, businesses and investment projects collapsed. This was accompanied by prolonged drought which forced the price of food to rise beyond the means of most Kenyans (Economic Stimulus Programme Handbook).

In the Standard Newspaper of 5<sup>th</sup> April, 2011 an article by John Ngunjiri reported that in 2009, the Kenyan economy was struggling to crawl out of a deep abyss of recession following the Post Election Violence. Worse still, the effects of economic crises were making it impossible for the economy to recover fast enough. According to the 2009 Economic Survey, the country had recorded a depressing Gross Domestic Product (GDP) growth of 1.7 percent in 2008 compared to an impressive record of 7.1 percent in 2007.

All these setbacks called for immediate action from the government to restore the economy to its earlier status. Thus in the 2009/2010 Budget, the then Finance Minister Uhuru Kenyatta launched the Economic Stimulus Program (ESP) to stimulate the growth of the Kenyan economy through the rapid creation of jobs and business opportunities all over the country (Economic Stimulus Programme Handbook).

The Economic Stimulus Programme was a government programme coordinated by the Ministry of Finance and Kshs. 22.0 Billion was committed to the Programme. The aim of the programme was to support local development projects in every Constituency. The construction of these projects would create employment and the finished project would provide essential services, jobs and business opportunities and enough food at the constituency level.

The key objectives of ESP included boosting of the country's economic recovery, investment in long term solutions to the challenges of food security, expansion of economic opportunities in rural areas for employment creation, promotion of regional development for equity and social stability, improvement of infrastructure and the quality of education and healthcare, investment in the conservation of the environment and expand the access to, and build the Information and Computer Technology (ICT) capacity in order to expand economic opportunities and accelerate economic growth.

To achieve the above outlined objectives, the Construction industry would play a key role and was therefore identified as a very important component of the ESP. Construction activity contributes to the economic development of a country as well as accelerating the economic growth of the nation. Construction is an employment spinner. It generates more employment than most of the sectors. It's worthy to note that this Industry contributes to 5% of the country's Gross Domestic Product (GDP) and employs more than one million people. According to report by Kenya National Bureau of Statistics (KNBS), the economy of Kenya grew by 4.9% in first Quarter of 2011 due to improved productivity in the construction industry (Kenya Business Review, February 24, 2012).

Various construction projects were identified for implementation under the Economic Stimulus Programme in various sectors of the economy distributed all over the country. The sectors were: - Education, Public Health, Local Government, Industrialization and Provincial Administration Offices. The projects which were identified in different sectors outlined above were designed, contracted and implemented under the supervision, guidance and control of the Ministry of Public Works (MOPW) the technical ministry charged with, amongst others, the mandate of "Development and Maintenance of Public Buildings" in accordance with the Presidential Circular

No. 1/2008 published in May 2008. The projects duration was initially meant to last for a period of Six (6) months after which the Programme would be closed out.

According to Treasury's Report on the status of implementation of the projects appearing in the Daily Nation Monday, November 5 2012, the Ministry of Education's out of the 365 Centers of Excellence to be established throughout the country, only 53 had been completed. The Ministry had also planned to build 421 Model Primary Schools, two in the 210 Constituencies. So far only 185 had been completed. Consequently the Ministry requested for an additional Kshs. 2.2 Billion to complete stalled projects.

Out of the 39 District Headquarters that were to be built, only Four (4) had been completed, while three (3) are yet to be started. And out of the 210 fresh produce markets that the Ministry of Local Government was to build, the Report says only 55 had been completed. The Ministry of Public Health had completed the construction of 136 health centres out of the targeted 210. Clearly this was not what the government intended and hence the need to carry out a study on the factors influencing effectiveness of construction projects implementation.

## **1.2 Statement of the Problem**

Construction project parties involved in a project aim to complete it successfully on schedule, within a planned budget, with the highest quality and in the safest manner (Mohammed, 2005). Projects are costly and high risk undertakings that need to be accomplished by certain date, for a certain amount of money and within some expected level of performance. Important aspects of a project includes "inputs" in the form of men, money, materials, and plans and "outputs" in the form of activities, products or services ( Asfandyar, 2012).

Considerable percentages of projects are falling behind schedule and recent study commissioned by the National Society of Professional Engineers (NSPE) concludes that about half of construction projects are behind schedule (Yahya, 2009). The recent history is littered with many examples of projects that have not succeeded as well as desired. In many instances, critical aspects of design were either poorly executed or overlooked altogether (Raed, 2007). Research has indicated that



quality of designs ó poor drawings were considered to be a cause of low productivity and hence ineffectiveness and delay is caused in the construction process when a drawing is incomplete or not available (Shahriyar, 2005).

Project Control is another integral part of the project management process. It aims at the regular monitoring of achievement by comparison against planned progress. When deviations from planned progress occur, plans may have to be changed. There are three elements to be controlled in a construction project ó progress against time; cost against tender or budget; quality against specification (Austin, 1995).

The Economic Stimulus Programme Construction Projects was no exception as it did not perform as per the intended plans. Most of the projects were not completed within the intended completion duration of Six (6) months. There were a host of challenges experienced during implementation stage. For example ESP experienced cost overruns, prolonged completion periods beyond the initially envisaged dates thereby denying clients of the opportunity to enjoy the facilities in good time while others have never to date been practically completed.

A general view held by stakeholders in the Construction industry and the public in general is that the industry within the Public Sector has not been efficient and effective in projects delivery. This is evidenced by the high number of stalled construction projects scattered all over the country. There is high rate of non completion of projects, cost overruns and extensions of contract periods as well as final products that do not meet the clientsø expectations.

A number of factors may be identified as contributing to the ineffectiveness of implementation of Construction projects. This research study intends to identify those factors and their influence on the effectiveness of project implementation. These factors include: the construction design changes, the selection process of contractors, project Funding levels, project cost control mechanisms and project scheduling systems/models.

### **1.3 Purpose of the Study**

The purpose of this study is therefore to investigate factors influencing the effectiveness of implementation of Economic Stimulus Programme on construction projects, Nairobi County.

### **1.4 Objectives of the Study**

The objectives of the study are:

1. To establish the influence of the changes in construction designs on the effectiveness of implementation of the Economic Stimulus Programme in Nairobi County;
2. To determine the influence of selection process of contractors on the effectiveness of implementation of the Economic Stimulus Programme in Nairobi County;
3. To assess the influence of project funding levels on the effectiveness of implementation of the Economic Stimulus Programme in Nairobi County;
4. To establish the influence of cost control mechanisms on the effectiveness of implementation of the Economic Stimulus Programme in Nairobi County;
5. To find out the influence of project scheduling systems/models on the effectiveness of implementation of the Economic Stimulus Programme in Nairobi County;

### **1.5 Research Questions**

This study was guided by the following questions:

1. To what extent do changes in construction designs influence the effectiveness of implementation of the Economic Stimulus Programme, the case of construction projects in Nairobi County?
2. To what extent does the Selection Process of contractors influence the effectiveness of the Economic Stimulus Programme, the case of construction projects in Nairobi County?

3. To what extent does a Project Funding level influence the effectiveness of implementation of the Economic Stimulus Programme, the case of construction projects in Nairobi County?
  
4. How do cost control mechanisms influence the effectiveness of implementation of the Economic Stimulus Programme, the case of construction projects in Nairobi County?
  
5. To what extent do Project Scheduling systems/models influence the effectiveness of implementation of the Economic Stimulus Programme, the case of construction projects in Nairobi County?

## **1.6 Significance of the study**

Construction Industry in any country plays key role in economic development and effective implementation of Construction projects contribute significantly to the economy. The outcome of this research study will contribute immensely and positively to the Construction Industry and in general the economic development of the country as it will assist project managers and implementers in addressing the issues that negatively influence effective implementation of Construction Projects. If this is done, then the high number of stalled projects, experiences of cost overruns and extended construction periods beyond the original completion dates will cease in this very important industry thereby save the country from unnecessary loss and wastage of much needed resources which are in scarce supply.

## **1.7 Basic Assumptions of the Study**

The assumptions of the study are that the recommendations of the research study from Nairobi County also apply to the Construction Industry in the entire country and especially the Public Sector and that respondents will provide honest and complete responses. It is also assumed the MOPW and other stakeholders will make use of the findings of the study.

## **1.8 Limitations of the Study**

Due to limitation of time and resources the study was narrowed to cover Economic Stimulus Programme Construction Projects in Nairobi County though the ESP was designed and implemented across the entire country.

## **1.9 Delimitation of the Study**

The major component of the Economic Stimulus Programme entailed implementation of Construction Projects falling under various Government Departments. The Conceptualization, Planning, Development and Production of Designs, Tendering Process, Award of Contracts, and Implementation Phase of the Projects were undertaken through the co operation and engagement of various stakeholders. These stakeholders comprised of the following: - The Treasury, Client Ministries, Ministry of Public Works and Representatives from Constituency Development Fund Offices.

The specific ministries were: - Ministries of Education, Industrialization, Health, Local Government and Office of the President Provincial Administration. All these Ministries had Projects in all the 210 Constituencies. This study will concentrate on ESP Construction Projects implemented in Nairobi County.

## **1.10 Definitions of Significant Terms used in the Study**

**Construction Projects:** Are projects undertaken by the government to facilitate provision of infrastructure to serve as a platform for production activities and comprises buildings, road network, bridges for enhancement of economic development.

**Economic Stimulus:** A government initiated programme intended to boost economic growth and lead the country out of recession through provision of funding to key public sectors/projects and hence facilitate creation of employment, markets for local materials, and provision of essential services, business opportunities and enough food at the constituency level.

**Effective Implementation:** Project delivered that meets the original objectives within the constraints and specifications of budget, time and quality.

### **1.11 Organization of the study**

The Research Study is organized under five main chapters. It starts with an introductory chapter which outlines the Statement of the problem, Research objectives as well as the Research questions, significance, assumptions, limitations and delimitations of the study. In Chapter Two Literature Review of all related literature is undertaken from various sources of materials that include journals and books. Chapter Three presents the Research Methodology adopted in the study. The same chapter also details the research design used, the target population as well as the sample used for the study. Chapter Four captures the Data Collection, Analysis and Presentation and finally Chapter Five that presents the study's Recommendations and Conclusions.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter covers review of theories and related literature by other authors in the field under study and specifically the study variables. The chapter shall also present conceptual framework to support the empirical review.

#### **2.2 Construction Industry**

Mankind has undertaken and has been engaged in some form of construction activities ever since the dawn of civilization. He has created architectural marvels which came to be regarded as the wonders of the world, for example, the Pyramids of Egypt, the Great Wall of China, the Angkor temples of Cambodia, the tower of Babel. Construction is an everlasting activity across the globe contributing between 6-9% of the Gross Domestic Product in most countries. Construction constitutes more than half of the fixed capital formation as infrastructure and public utilities capital works required for economic development (Chitkara, 2009).

#### **2.3 Construction Projects**

Governments and organizations usually embark on different projects with the aim of creating new service or improving the functional efficiency of the existing ones. Such projects require appropriate skills and techniques that encompass good and sound skills to manage limited budgets, monitor shrinking schedules and unpredicated outcomes while at the same time dealing with people and organizational issues. Developmental facilities like housing, roads, and power plants are undertaken with strategic aims of developing infrastructure to facilitate economic growth ( Olateju, 2011; Chitkara, 2009).

Construction Projects are undertakings that have a beginning and an end and are carried out to meet established goals within costs, schedules and quality objectives (Marion, 2002). These specified

deliverables (also commonly known as scope), are also referred to as "direct project objectives or goals" have been accepted as the primary determinants of project success or failure (Jack, 2012). Time and cost performances constitute fundamental criteria for success of any project (Aftab, 2012).

Every project has a limited budget and there is a point at which there are no resources remaining to fund the work of the project. If the Project Manager goes beyond that point, then the work of the project will remain unfinished until new funds are available. A critical step of beginning a successful project is making certain that the cost estimates for the project is reasonable and acceptable (Griffin, 2010).

## **2.4 Construction Life Cycle**

Project has a predetermined duration with definite beginning and identifiable end. There are four major and distinct phases in a Project life cycle. In the project initiation phase, the customer identifies a need, problem or opportunity which can result to a write up document referred to as a request for proposal (RFP). Through the RFP, the customer asks individuals or contractors to submit proposals on how they might solve the problem, along with associated cost and schedule. Proposed solution development phase follows and contractors develop approaches to solving the customers need or problem, estimates the types and amounts of resources that would be needed as well as the time it would take to design and implement the proposed solution. They submit their proposals to the customer. Implementation of the proposed solution phase is the performance of the project which involves doing the detailed planning for the project and then implementing the plan to accomplish the project objective. Different resources are utilized. Finally there is the project termination phase which involves certain close-out activities such as confirming that all deliverables have been provided to and accepted by the customer (Jack, 2009).

## **2.5 Performance of Construction Industry**

The key to economic and social growth in all countries, developed and developing, is better management in all sectors: agriculture, industry, public works, education, public health, government (Louis, 1988). Proper planning and anticipating the problem areas is all part of the project

management process. There is growing awareness of the need to improve both the productivity and quality of projects. Successful performance in a construction project helps to deliver good products to the client. The quality of finished project, construction cost and construction time were the most important project priorities of performance criteria within client perspective Malaysia (Arazi, 2011).

Delays in project completion and poor performance in the construction industry has been experienced and has led to failure in achieving effective time and cost performance (Aftab, 2012). This delay is a common phenomenon that occurs especially where the government projects are concerned in Malaysia (Tawil, 2013). In a study conducted to identify significant factors causing cost overruns in large construction projects in Malaysia, the top three factors are fluctuation of materials, cash flow and financial difficulties faced by contractors and poor site management and supervision (Rahman, 2013).

Oyewobi, (2012) observed it is almost impossible to have projects completed within the initial cost and time in Nigeria, as a result of many factors the construction industry is being plagued with ranging from estimating risk of time and cost overruns. Defects in design, inflation, contractors' competence, political uncertainty as well as changes in government had the greatest impact on contractors' tender figure which contributes to projects' delay.

In Pakistan the problem of project delays hence poor project performance is a fact that occurs mostly in construction industry (Haseeb, 2011). Delays are always measured as expensive to all parties concerned and very often it will result in clash, claims, total desertion and much difficulty for the feasibility and it slows the growth of construction industry. Natural disasters like flood and earthquake, Financial and Payment problems, improper planning and poor site organization, insufficient experience and shortage of materials and equipments are factors that cause delays.

Abdelhak, (2012) makes similar observations of problems of delay in the field of construction. Analysis of causes of deadline slippage in construction projects completed in several regions of Morocco were identified as errors made in the initial budget assessment, volatility of the architecture and engineering programme (multiple modification requests) and construction site hazards.



Disputes have frequently been claimed to proliferate in the construction industry resulting in drawbacks and disharmonizations in the completion of the projects with considerable costs. The following are dispute factors related to public work projects noted in Thailand:- violations of conditions of contract, insufficient work drawing details, delays in the progress payments by the owner, poor evaluation of completed works, inaccurate bill of quantities and unrealistic contract durations during the project construction phase ( Borvorn, 2011).

In Kenya, Nyika (2012) noted that only 20.8 per cent of the projects were implemented on time and budget, while 79.2 per cent exhibited some form of failure. The major causes of failures were insufficient implementing capacity, poor project management, weak project design and political interference.

## **2.6 Project Design Process**

Project Design is the second major phase in the Life Cycle of a Construction Project. The design process is undertaken by a team of architects and specialists responsible for translating the client's requirements into reality. It involves preparation of the necessary production information, including working drawings and specifications and to complete all arrangements for obtaining tenders (Austen, 1984).

Design and documentation issues, project management and contract administration issues are major contributors to poor performance in projects (Aftab, 2012). Frequent construction design changes during project implementation are commonly practiced and are a major inhibiting factor in achieving successful completion of projects. This is due to the fact that such design changes may lead to variations in project costs as well as project contract period. The additional project costs may not have been budgeted as they were not part of the tender sums. Other causes of delays associated with changes in construction designs that are encountered in construction projects are engineering i.e. quality of designs, inaccurate drawings, incomplete drawings, defects in designs and late engineering (Muhamad, 2011; Oyewobi, 2012 ).

Adequate and accurate drawings and specifications are indispensable if the project is going to achieve success in terms of quality, time, and cost. Time spent on preparing documents, which aid the contractor to understand the work, will benefit the finished product (Martin, 2004). Designing stage is a very important stage in the field of construction because any modification in the project after this stage would prove expensive. A realistic and detailed cost estimate of the project can be prepared during design stage (Gahlot, 2002).

## **2.7 Contractors Selection Process**

Successful completion of construction projects requires many important processes and one of them is bidding process during which selecting the most appropriate main contractor to implement the project is done. Clients may have their own preferred criteria. Professionals in the construction industry approach the selection process from a different perspective from the clients. Professionals operating in Malaysia use their accumulated experience and judgment. Track performance, financial capacity and technical capacity are the most important criteria considered crucial by the selection of main contractor to undertake the construction project (Arazi, 2011).

Xiaohong (2011) concurs and says that construction contractors have big influences upon projects and their successes. It is quite critical to select a qualified contractor in the process of construction management as a competent construction contractor is one of the indispensable conditions of a proper process and completion of a construction project. Various models and frameworks have been adopted to evaluate contractor's bids to facilitate selection of the most appropriate one. First there should be cost consideration framework whereby the lowest bidder is selected. This system protects the public from improper practices although unreasonably low bids either accidentally or deliberately or unqualified contractor may cause extensive delay, cost overrun, quality problems and increased number of disputes.

The Prequalification Method evaluates the contractor's competence which ensures only quality contractors participate in the bidding process for the project. Construction Management at Risk Method (CMAR) ensures provision of input to the designer to increase constructability of designs and to decrease schedule duration through overlapping of the design and construction phases. It

aims to reduce the risk of cost overrun and schedule creep and to expedite the construction process without compromising quality. The Multi Criteria Evaluation Models considers many important contractors attributes as the reason for awarding the contract. These include bid price/cost, time, quality, managerial safety accountability, competence and sufficiency of contractors. Many factors should be considered during the contractors' qualification screening. The key components to be examined are financial standing, technical ability, managerial capability, quality and current projects backlog.

According to Olabosipo (2011) the five most important factors influencing the choice of subcontractors by the clients and contractors, in three commercial nerve centers in Nigeria (Lagos, Abuja and Port Harcourt) were: past experience in terms of size and type of projects completed, management resource in terms of formal and informal training, project facilitation in terms on labour and plant resources, past relationships with the clients and contractors ( past performance) and other related issues in terms of nature of contract and time of the year ( weather).

The route taken by most major companies in the selection of a contractor are screening of enquiries, inviting interest and specific statements of capability and resources, an invitation to bid from a shortlist of suitable contractors, contract award based upon evaluation of bids in terms of technical and commercial proposals, to complete sections of the design before letting corresponding construction contracts and to minimize changes once construction starts (Arnold, 1999).

Evaluating which tenderer to award a contract requires assessment of the capability and relevant experience of the tenderers. The client may want to obtain assurance from tenderers on a number of different levels for example the tenderer's financial stability and ability to carry out the works tendered for, the tenderer's reputation, the tenderer's experience and management expertise, the quality of the delivered product, interim products and deliverables, and application of technical standards Mike (1998).

## **2.8 Project Funding Levels**

Amongst the basic conditions for smooth project activity operations without stoppages and unnecessary disruptions is regular and sufficient funding of the project. Regular and on schedule progress of work activities on site require sufficient cash flow in order to facilitate procurement of materials, plants and equipments on time as well as remuneration of labour force.

Some of the causes of delays in construction projects and poor performance in Malaysia noted were insufficient capital delay in receiving the advance payment, financial resource management, progress payment behind time and delay in payment of completed works from the owner to the contractor. Contractors do not have strong financial background to keep the work in progress. When the contractors' cash flow is significantly affected this causes delay in procurement of resources. Consequently time and cost performance of projects is affected (Tawil, 2013; Aftab, 2012).

## **2.9 Project Cost Control**

Project cost control is an integral part of the management of a project. Project cost control aims at controlling changes to the project budget and it provides management with cost related information for making decisions with a view to complete the project specified quality, on time and within budgeted costs (Chitkara, 2009). Controlling project costs entails development of a specific cost control plan for each project which involves estimating costs of the project, creation of the project's budget and employment of cost control tools (Joseph, 2010).

### **2.9.1 Estimate Costs**

During the initiation phase, the Project Manager prepares a preliminary cost estimate for submission of bid to the potential client. Total Construction Cost Estimate is prepared by breaking down the different parts of the Project; next, a cost is assigned to each of these smaller components; then they are aggregated together to provide a quote for a certain portion of the Project. After all these small components are assigned a cost and aggregated together, the project manager adds them up to obtain a total construction cost estimate (Joseph, 2010).

Cost Control is necessary to have a master control estimate prepared during the project planning stage. It is made up of direct costs, indirect cost and funds earmarked for contingencies and escalation. During the execution stage, master control estimate is revised at a predetermined frequency (say half yearly), and in its approved revision, is called current control estimate (Chitkara, 2009).

### **2.9.2 Project Budget**

Project budget is the well coordinated and management approved financial plan of operations, indicating the amounts required for achieving assigned targets, and the expected receipts from sales or the value of work done (Chitkara, 2009). Effective cost control of project costs requires adherence to the project budget during implementation of the project.

### **2.9.3 Cost Control Tools**

Cost control tools that are employed are variance analysis and earned value analysis. In variance analysis the project manager compares the actual results with the planned results in a spreadsheet or graph format to demonstrate how much variance there is between the actual results and the planned results. Cost Variance is the difference between Budgeted Cost of Work Performed and Actual Cost of Work Performed (Joseph, 2010; Chitkara, 2009).

(Cost Variance = BCWP ó ACWP).

Earned Value Analysis (also referred to as Earned Value Management) is a project performance measurement and monitoring tool as well as a forecasting tool. The cost performance of a project can be determined as:

$$\text{Project progress (\%)} = \frac{\text{Budgeted cost of work performed}}{\text{Budgeted cost of total project}} \times 100$$

## **2.10 Project Scheduling**

Project Schedule is a written or graphical representation of the contractor's plan for completing a construction project that emphasizes the elements of time and sequence. The plan will typically identify the major work items (activities) and depict the sequence (logic) in which these work items will be constructed to complete the project. Project schedule is also an estimate of the time required to construct the project and is a valuable project control tool used to effectively manage construction projects. When it is used properly, it allows management to control and measure the pace of the work and provides the participants with the information to make timely decisions (Theodore, 2009).

Making a schedule for a construction project means a plan with the sequence of operations and the list of resources, i.e. work force, materials, machines, as they correspond to the project. Failure to make a schedule or devising a wrong schedule can result in delay of a deadline and can cost the various stakeholders in the project a lot of money so a proper and well established schedule can help a lot to avoid excess costs and unwanted delays (Mikloš, 1997).

### **2.10.1 Project Scheduling Techniques**

Scheduling techniques can be classified as non network and network-based scheduling techniques. The most common scheduling techniques used for construction projects are Narrative schedules, Gantt Charts or bar charts, linear schedules, critical path method (CPM) schedules and program evaluation and review techniques (PERT) (Mikloš, 1997; Theodore, 2009).

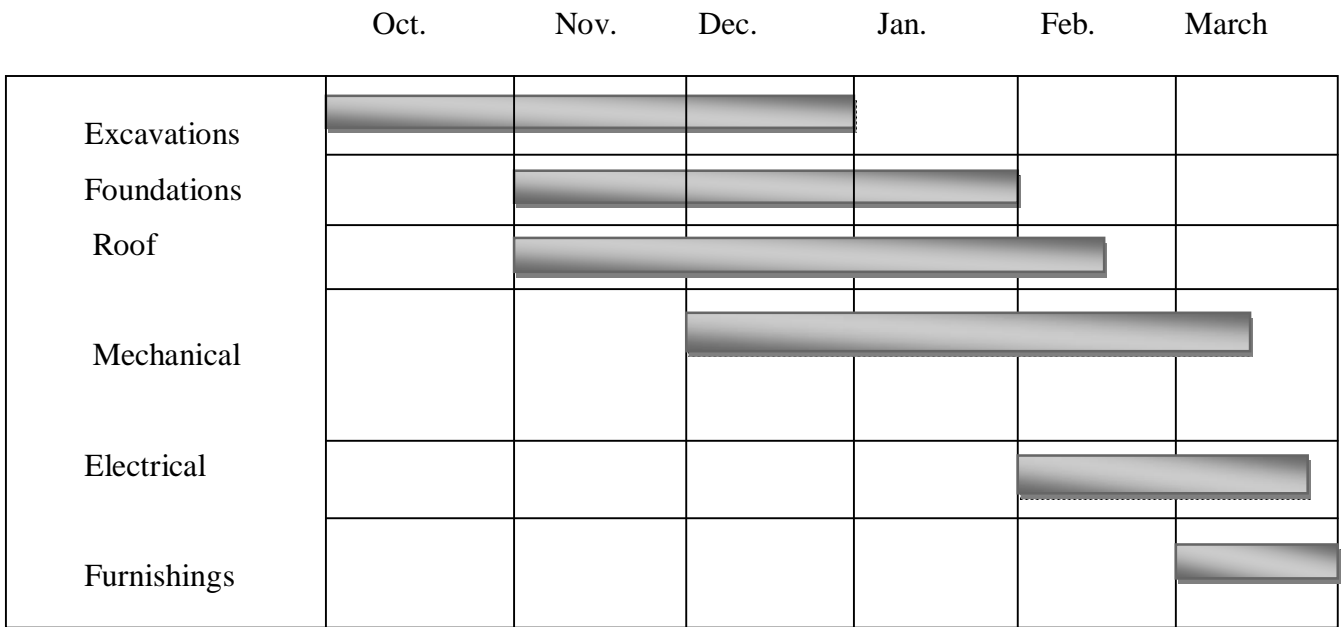
#### **2.10.1.1 Narrative Scheduling**

Narrative schedule consists of a narrative description of the contractor's planned construction sequence and is typically submitted prior to the start of the work. For example, a narrative schedule may tell the owner that the contractor plans to work across the project site in east to west fashion (Theodore, 2009).

### 2.10.1.2 Gantt Chart or Bar Chart

It shows graphical representation of the duration of tasks against the progression of time. It is a collection of activities listed vertically and the horizontal scale represents the time (Olateju, 2011; Miklos, 1997).

A sample bar chart is reproduced in Fig 1 below



**Figure 1:** An example bar chart for a small project

Bar chart is a good tool in scheduling of small projects and can be the best visualization form of any size projects.

### 2.10.1.3 Linear Scheduling Method (LSM)

The horizontal axis plots time, the vertical axis plots location along the length of project or percentage of the work performed. Individual activities are plotted separately and can be broken at any time (Miklos, 1997).

#### **2.10.1.4 Critical Path Method Schedules (CPM)**

A CPM schedule is an arrow diagram or logic network of the work activities that graphically or visually represents the construction plan. CPM contains all of the Project work items and connects or links those work activities to one another according to their planned sequence. CPM schedule strength lies in the ability to identify the critical path or the longest path of work through the network which predicts the earliest date that the project can be completed. It is a Project Network Analysis technique used to determine which sequence of activities (path) has the least amount of scheduling flexibility and therefore will most likely determine when the project can be completed. CPM is a dynamic modeling tool that can identify issues and problems before they arise (Theodore, 2009; Olateju, 2011).

#### **2.10.1.5 Program Evaluation and Review Technique (PERT)**

PERT is an event-and-probability based network analysis system generally used in projects where activities and their durations are difficult to define (Olateju, 2011). It is an event oriented network analysis technique used to estimate project duration when individual activity duration estimates are highly uncertain. PERT requires the user to set three durations that constitute the practical range of the duration for each activity which is: - the optimistic duration ( $T_o$ ); the most likely duration ( $T_m$ ) and the pessimistic duration ( $T_p$ ). The optimistic duration is the amount of time the activity will take if everything goes smoothly and efficiently. The pessimistic duration is the duration under the worst- case scenario and both values must be within the realistic realm of expectations (Saleh, 2010).

The mean weighted value for these three durations is called the expected duration ( $T_e$ ). It is calculated as follows;

$$T_e = \frac{T_o + 4T_m + T_p}{6}$$



## **2.11 Summary of Literature Review**

There are critical factors that contribute to the effectiveness of implementation of construction projects. The influence of changes in construction designs on effective implementation of projects was discussed by (Aftab, 2012; Oyewobi, 2012; Martin, 2004; Gahlot, 2004) as follows: poor performance due to designs and documentation, defects in designs, need for adequate and accurate drawings and specifications and realistic and detailed cost estimates.

From previous studies it has been established that selection of the most appropriate contractor influences the implementation of construction project. Arazi (2011) talks of the most appropriate contractor; Xiaohong (2011) says selection of the qualified contractor; Olabosipo (2011) refers to past experience in terms of size and type of project; Arnold (1999) says shortlisting of suitable contractors and Mike (1998) refers to assessing capacity and relevant experience.

Project funding levels has been identified as contributing factor to effectiveness in implementation of projects. Tawil (2013) says insufficient funding affects projects while Aftab (2012) refers to delays in payments for valuations of works done negatively impacts on projects implementation.

Project cost control is very important as was observed by Joseph (2010) who talks of the need to develop specific cost control plan for each project. Chitkara (2009) says a master control estimate as well as control tools should be employed in projects in order to enhance project implementation effectiveness.

Theodore (2009) says that project scheduling is crucial and estimation of the time required to construct the project should be done. Miklosø (1997) says a schedule is a plan with sequence of operation and list of resources as well as project scheduling techniques.

## **2.12 Study gap to be filled**

A number of studies have been undertaken on various aspects of construction industry which include causes of projects delay, projects cost overrun, non-completion of projects, poor or sub

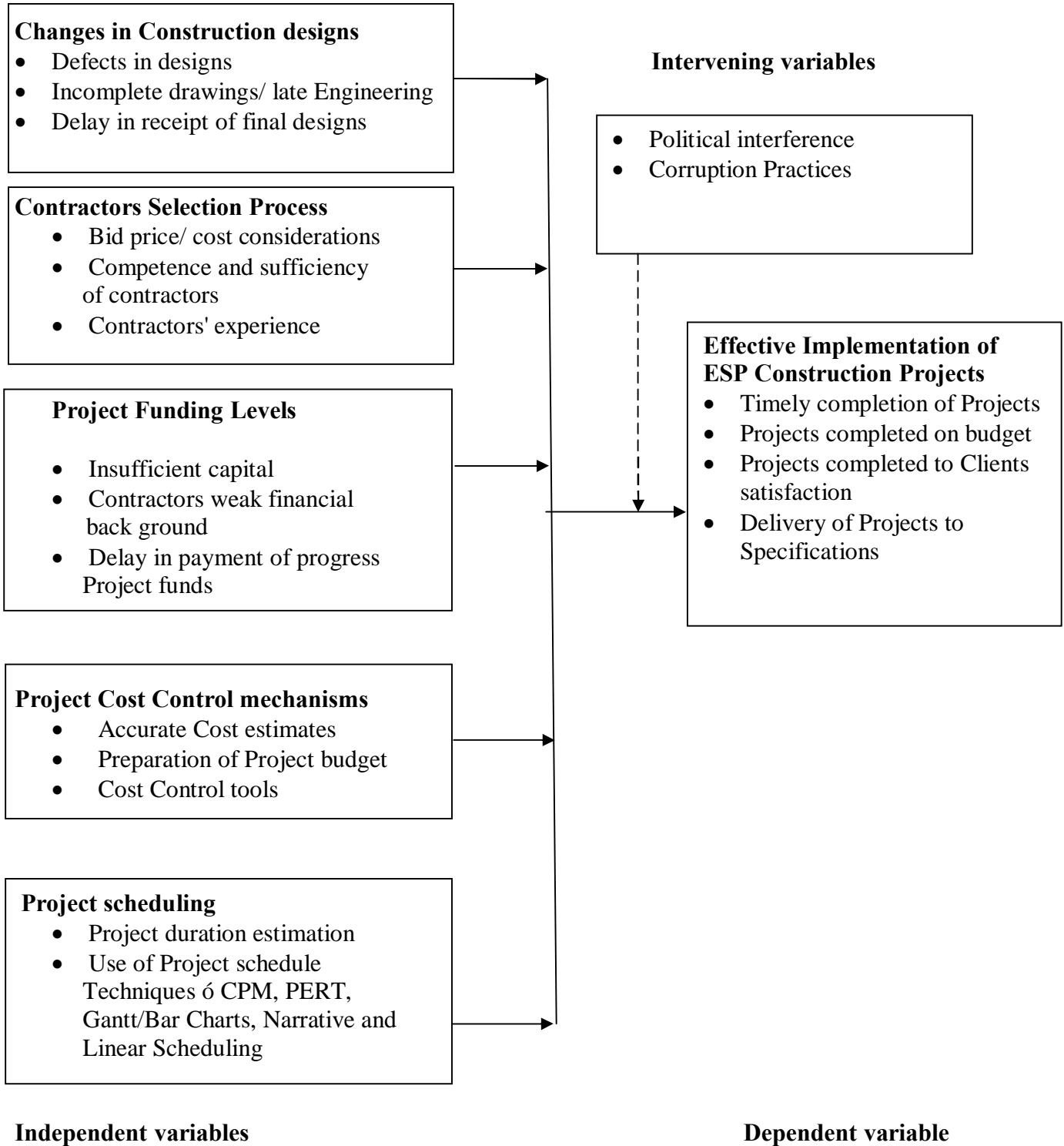
standard works not to specification, disputes in projects and loss of project finances. The review of related literature reveal that this has been undertaken in other parts of the world with little evidence of similar study as far as the local scene is concerned. As was noted in the introduction, the building industry contributes significantly to the growth and development of any given economy in the world hence the need for evaluation as well as careful monitoring in its performance.

Many construction projects continue to experience cost overruns, extensions and revisions in completion dates while others end up stalling completely. As a consequence, the country loses a lot of much needed financial resources which would be utilized elsewhere if the projects were implemented successfully. There is a need to critically examine the factors that influence effectiveness of implementation of construction projects hence the study of the ESP the case of construction projects, Nairobi County so that the challenges of stalled construction projects can be addressed adequately.

### **2.13 Conceptual Framework**

The relationship between independent variables: - changes in Construction Designs, Contractors Selection Process, Project Funding levels, Project Cost Control and Project Scheduling are illustrated in figure 1.2, conceptual framework.

**Figure 2: Conceptual framework**



### **2.13.1 Relationship between Variables**

The relationship between the independent and dependent variables is discussed in the sections that follow.

#### **2.13.1.1 Changes in construction designs**

Changes to construction design documents can significantly change the scope of the Project necessitating amendments in the Project duration Scheduling, Project Costs, Procurement processes and human resource management. The said changes could arise as a result of client's requests, incomplete drawings at the time of tendering process, errors and defects in designs or poor site investigations leading to circumstances that were unforeseen. Such changes in design when Project has already commenced has a bearing on Projects costs as well as Project Duration and could lead to cost overruns and extended project durations.

#### **2.13.1.2 Contractors Selection Process**

The selection process of the contractor to undertake works should have a well defined criterion. The criteria should be adhered to so as to facilitate selection of the right contractor to undertake the works hence ensuring effectiveness in construction projects.

#### **2.13.1.3 Project Funding Levels**

Projects cannot run smoothly if funding is either insufficient or is not forthcoming. It is therefore of utmost essence to facilitate and ensure adequate project funding is maintained throughout the life cycle of the project so as to avoid delays in works or stalling of the project altogether. Delivery of project on time also avoids unnecessary cost overruns and subsequent contractual disputes.

#### **2.13.1.4 Project Cost control**

Effectiveness in implementation of construction projects requires the exercise of project cost control so as to avoid cost overruns. Execution of a project whose scope is beyond the available financial resources can lead to cost overruns, delays in project completion, stalled projects as well as contractual disputes. This eventually ends up with ineffective project implementation.

#### **2.13.1.5 Project Scheduling**

Project duration estimation should be realistic and the appropriate project scheduling tools should be employed in project scheduling so as to achieve timely management of the project.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter discusses the research methodology as well as the research design adopted in carrying out the research study. There is also description of the sources and types of data, sampling and sampling procedure and the procedures of data collection.

#### **3.2 Research Design**

Research design provides a framework for the collection and analysis of data. Quantitative research methodology is used in this research study and specifically survey design which is also called cross-sectional design. The design is appropriate as survey design entails the collection of data on more than one case and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with two or more variables, which are then examined to detect patterns of association (Bryman, 2012). The study collected information and data from respondents on their opinions and experiences on the factors influencing the effectiveness of implementation of ESP Construction projects in Nairobi County.

#### **3.3 Target Population**

The study targeted all the ESP Building Construction Projects in Nairobi County designed and implemented under the Supervision of Ministry of Public Works between July and December 2009. The Target Population is made up of Thirty Seven (37) Building Projects falling under various Government Departments.

### 3.4 Sampling and Sampling Procedures

Sampling is the act, process or technique of selecting a suitable sample or a representative part of a population for the determining parameters or characteristics of the whole population. A sampling frame is a list, directory or index of cases, that enables realization of a representative sample (Donald, 2006; Mugenda & Mugenda, 2003).

**Table 3.1: Sampling Frame**

Project Department	Population	Percentage
Primary Schools	16	43.0
Secondary Schools	15	40.5
District Headquarters	5	13.5
CIDC	1	3.0
<b>Totals</b>	<b>37</b>	<b>100</b>

**Source: County Public Works Office – Nairobi County, (2013)**

#### 3.4.1 Sample Size

A sample is the segment of the population that is selected for investigation. It is also small group taken from a larger population composed of members being studied (Bryman, 2012; Maximiano, 2007). This research uses the Krejcie and Morgan (1970) table of determining sample size from the population as shown in Appendix 111. With a confidence level of 95%, and a margin of error of 5% and a target population of Thirty Seven (37) projects, the table gave a sample size of Thirty Seven (37) ESP construction projects.

### 3.4.2 Sampling Techniques

Simple Random sampling technique was adopted in this research study to select respondents from the Thirty Seven (37) ESP construction projects. The ESP construction projects were undertaken in the Ministries of Education, Industrialization, and Provincial Administration and Internal Security. The projects in the different ministries formed strata, the sample size of the Thirty Seven and were all selected as shown in Table 3.2. Four lists of projects from the Four Ministries were produced and used to obtain the same number of members for each sample strata.

**Table 3.2: Sampling Table**

Project Department	Population	Sample	Percentage
Primary Schools	16	16	44.5
Secondary Schools	15	15	41.5
District Headquarters	5	5	11
CIDC	1	1	3
<b>Totals</b>	<b>37</b>	<b>37</b>	<b>100</b>

### 3.5 Data Collection Instruments

Respondents were requested to answer questions by completing the questionnaire supplied by the researchers' assistants. Thereafter the questionnaires, once filled, were collected by the researchers' assistants. One advantage is that the respondents were able to complete the questionnaires when they want and at the speed that they want to go. The self completion questionnaires combined both open and closed questions. In the open questions, the respondents were asked questions and instructed to answer however they wish. In the closed question, the respondents were presented with a set of fixed alternatives from which they chose the appropriate answer.



The questionnaire contained two Sections A and B. Section A asked questions pertaining to the respondents' personal details whereas Section B contained questions designed to capture the respondents' response to the research questions. Questionnaires were prepared on Likert Type scale of one to five to sample the opinion of the respondents who were required to indicate their level of assessment concerning concepts being measured. A five ordered response levels scale were used which are: 5 = very great, 4 = great, 3 = minor, 2 = no effect, 1 = not sure.

### **3.5.1 Piloting of Instruments**

Due to the importance and need to detect and determine weaknesses in the instrument that was applied in the research study, the self administered questionnaire was pre-tested before distributing it to the whole sample. The researcher used a colleague and respondents to evaluate and refine the measuring instrument. Gathered proposed suggestions for amendments and adjustments were made to produce an instrument for use in the field.

### **3.5.2 Validity of the Instruments**

Content validity of the self administered questionnaires was established by carefully designing clear and unambiguous questions making it easy for the respondents to easily answer all questions. The study supervisor guided, offered advice and all necessary approvals in the input in the research questionnaire hence enabling the content to address the purpose and avoided ambiguity.

### **3.5.3 Reliability of the Research Instrument**

To establish internal consistency of research instrument a score obtained in one item was correlated with scores obtained from other items in the instruments. Cronbach's Coefficient Alpha was computed to determine how items correlate using the Kuder-Richardson (K-R) 20 formula.

The reliability's benchmark in this study was a reliability correlation coefficient of 0.6 to 0.9. The correlation coefficient of the administration was 0.75 and is within the recommended range, the instrument was considered reliable and therefore used to collect data for the study.

### **3.6 Data Collection Procedures**

Data collection was carried out through self administered questionnaire survey. Thirty Seven experienced respondents were selected from each of the following three groups namely Clients, Consultants and Contractors for participation in the survey. Data collection was undertaken after approval of the questionnaire instrument. Telephone contacts and physical address of respondents were obtained. The questionnaire was self administered. Deliveries were carried out, reminders made and personal collection was done by the researcher and two research assistants. The respondents were asked to fill the questionnaires in two weeks and then the researcher organized to get the questionnaires back.

### **3.7 Data Analysis Techniques**

The data that was collected was arranged in groups and the categorized into nominal, ordinal, ratio and interval scales of measurements. Thereafter after coding, the organized data was analyzed by use Statistical Package for Social Sciences (SPSS) Version 17 computerized software. Open-ended questions data that are qualitative in nature were then analyzed through deriving explanations and interpretations of the findings by use of descriptions. Here the researcher was looking for description of patterns and uniqueness in the data collected. Conclusions were made from numerical values through quantification process for purposes of comparisons and validation of the findings. The findings from the ground are presented through tables and percentages and frequencies used to present descriptive analysis findings.

### **3.8 Ethical Considerations**

This study handled ethical issues by instituting various measures commencing with the use of introductory letter (Appendix 1) that sought consent and voluntary participation of the respondents. The letter and the accompanying questionnaire communicated the purpose of the study and the process of conduction of the study. The right of confidentiality and anonymity was also assured and there was nowhere where identity of respondents was sought in the collection instruments. The data that was gathered and information was treated in such a way that it was impossible to trace it to any

person or enterprise. The research study also treated all people with respect and courtesy. Objectivity was the guiding principle throughout the research process including design, data collection, analysis and interpretation of data.

**Table 3.3: Operational definition of Variables**

<b>Objectives</b>	<b>Variable</b>	<b>Indicators</b>	<b>Measurement Scale</b>	<b>Type of Analysis</b>
Influence of changes in Construction designs on effective implementation on projects	Construction design changes	<ul style="list-style-type: none"> <li>• Delay in project commencement</li> <li>• Completion delay</li> <li>• Cost variations/overruns</li> <li>• Project quality</li> </ul>	Nominal and ordinal scales	Descriptive Statistics
Influence of contractor selection process on effective implementation on projects	Contractor Selection process	<ul style="list-style-type: none"> <li>• Lowest Bidder</li> <li>• Financial capacity</li> <li>• Technical Capacity</li> <li>• Management capacity</li> <li>• Past Experience similar projects</li> </ul>	Nominal and ordinal scales	Descriptive Statistics
Influence of Project Funding levels on effective implementation on projects	Project Funding levels	<ul style="list-style-type: none"> <li>• Adequate funding</li> <li>• Phased funding</li> <li>• Intermittent funding</li> <li>• Delays in payment of progress valuations</li> </ul>	Nominal and ordinal scales	Descriptive Statistics
Influence of Project cost control mechanisms on effective implementation on projects	Project Cost Control mechanisms	<ul style="list-style-type: none"> <li>• Accuracy in project cost estimates</li> <li>• Project Budgeting</li> <li>• Employment of Cost control tools</li> </ul>	Nominal and ordinal scales	Descriptive Statistics
Influence of Project Scheduling on effective implementation on projects	Project Scheduling	<ul style="list-style-type: none"> <li>• Project duration estimation</li> <li>• Project scheduling tools</li> <li>• Gantt charts, CPM,PERT</li> </ul>	Nominal and ordinal scales	Descriptive Statistics
Dependent Variable	Effective Implementation of ESP construction Projects	<ul style="list-style-type: none"> <li>• Timely project delivery</li> <li>• Project completion on budget</li> <li>• Project delivered as per specifications</li> <li>• Projects delivered to clients satisfaction</li> </ul>	Ordinal and interval scales	Descriptive Statistics

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.0 Introduction

Chapter four is a presentation of analysis of data obtained from the fielded items in the study questionnaire. From the findings, analysis and presentation was done through frequency tables, numerical values and percentages produced through Statistical Package for Social Science (SPSS) (Version 17) computer software. Thereafter there is presentation and then a brief description which is guided by the objectives of the research and a discussion on the research findings from the analysis of the data.

#### 4.1 Response rate of the study

The questionnaires were distributed to 37 randomly selected respondents and 36 were completed and returned, giving a response rate of 97.00 %. This compares with Ade (2013) in which 30 selected respondents were contacted and the response was 21 which translates to 70% response rate. The collection procedures entailed personal administration, follow up after distribution of questionnaires through mobile phone calls for confirmation date when they would be ready for collection and personal collection whenever possible. The response rate was found to be sufficiently adequate for analysis and for discussions of the study findings when compared to other results in the construction industry by Aftab (2010) ó 71.11%, Abdullah (2011) ó 82.2% and Haseeb (2011) ó 60%. The unreturned questionnaire 1(3.0%) could be attributed to delay on the part of the respondent completing and hence being unable to return by 3<sup>rd</sup> July 2013.

#### **Table 4.1: Response rate of the study**

The response rate of the study is indicated in Table 4.1 below.

<b>Results</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Respondents	36	97
Non Respondents	1	3
<b>Total</b>	<b>37</b>	<b>100</b>

#### **4.2 Background of the respondents**

The demographic characteristics of the respondents are analyzed in terms of gender, highest educational level, age and categories and as shown below.

##### **4.2.1 Gender profile of the respondents**

The respondents indicated their gender profile in terms of either male or female in order to determine the nature of gender relations in the construction industry. **Table 4.2** illustrates gender profile of the sample.

**Table 4.2: Gender of respondents**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Male	33	94
Female	3	6
<b>Total</b>	<b>36</b>	<b>100</b>

The study found that 33 (94 %) respondents were male and 3 (6%) female. The results indicate the construction industry is dominated by the male gender who account for the overwhelming majority of the respondents. The study results compare well and are consistent with the study of Zaherawati (2010) in which all the respondents were of the male gender i.e. 100% confirming that the industry is male dominated.

#### 4.2.2 Highest education level

The respondents were requested to state the highest level of achievement for academic qualifications. Table 4.3 illustrates the levels of qualification for the entire sample.

**Table 4.3: Highest education level**

<b>Education level</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Certificate	0	0
Diploma	6	16
Degree	20	56
Masters	10	28
Phd	0	0
Other	0	0
<b>Total</b>	<b>36</b>	<b>100</b>

The respondents are largely degree as well as post graduate degree holders. More than half 20 (56%) of the respondents had a first degree, 10 (28%) respondents had masters degree and 6 (16%) respondents had a diploma. There was neither PHD nor Certificate holders from the respondents. This is consistent with Ameh (2011) study who observed that 67 % of the respondents had a first degree or its equivalent. Ade (2013) study, he observed that all the respondents had obtained degrees and above qualifications i.e. 100%. This shows that the respondents are capable and reliable to explore the underpinning issues related to the study.



### 4.2.3 Age of respondents

The respondents stated their age brackets as requested in the questionnaire and the results are shown in table 4.4 below.

**Table 4.4: Age of respondents**

<b>Ages</b>	<b>Frequency</b>	<b>Percentage (%)</b>
20 -29 yrs	0	0
30 ó 39 yrs	6	17
40 ó 49 yrs	20	55
50 ó 59 yrs	9	25
60 yrs and above	1	3
<b>Total</b>	<b>36</b>	<b>100</b>

Majority of the respondents 20 (55%) fall within 40 to 49 years of age. This is followed by 9 (25%) in the age group of 50 to 59 years. There are 6 (17%) respondents in the age of 30 to 39 years. The age bracket of 60 years and above had only 1 (3%) respondent. A cumulative 72% of the respondents are within 30 ó 49 years. Ameh (2011) study made similar observations whereby 91% of the respondents were within 30 - 49 years of age.

### 4.2.4 Classification of respondents

The questionnaires were distributed to the stakeholders in the construction industry and these are clients (employers), consultants and contractors. The response is shown in table 4.5.

**Table 4.5: Classification of respondents**

<b>Participants</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Client	13	36
Consultant	13	36
Contractor	10	28
<b>Total</b>	<b>36</b>	<b>100</b>

Table 4.5 indicates that the respondents comprised of 13 (36%) from Clients, 13 (36%) from Consultants while Contractors respondents accounted for 10 (28%) of the respondents. The three categories of respondents are the main stakeholders as well as participants in the construction industry and it was therefore necessary to engage and involve them in this study so as to obtain their varied and different perspectives and experiences. In Nagapan (2012) study, the respondents comprised of 51% Contractors, 34% were consultants and 15% of the respondents were Clients.

#### **4.2.5 Cross tabulation of classification of respondents and highest education level**

Cross tabulation is intended to summarize data so as to reveal relationship between two variables; in this case classification of respondents and highest education level. The stakeholders targeted in the study were Clients, Consultants and Contractors and they are the main participants in the construction industry. The analysis of the cross tabulation is shown on Table 4.6.

**Table 4.6 Cross tabulation of classification of respondents and highest education level**

Respondents	Highest education level					
	Diploma		Degree and above		Total	
	No.	%	No	%	No	%
Client	2	6	11	30	13	36
Consultant	0	0	13	36	13	36
Contractor	4	11	6	17	10	28
<b>Total</b>	<b>6</b>	<b>17</b>	<b>30</b>	<b>83</b>	<b>36</b>	<b>100</b>

The study found that 30 (83%) respondents from the three participants (Clients, Consultants and Contractors) had degree and above qualifications while only 6 (17%) had diploma. All the consultants respondents 13 (36%), 11 (30%) client respondents and 6 (17%) contractors respondents had degree qualifications. Only 2 (6%) client respondents and 4 (11%) contractor respondents had diploma qualifications.

### **4.3 Presentation of analysis according to research questions**

The research data from the questionnaire was used to investigate how the respondents rated the influence of changes in construction designs, contractors selection process, project funding levels, project cost control mechanisms and project scheduling models on effectiveness of implementation of economic stimulus programme construction projects.

### 4.3.1 Influence of changes in construction designs on effectiveness of implementation of Construction projects

Changes in construction designs may and normally occur during the implementation stage of the construction project. When this happens, other aspects of the project may be influenced one way or the other. It becomes imperative to monitor the impact occasioned by the said changes in construction designs. The respondents were asked to indicate whether there were such changes in the ESP construction projects during implementation. Table 4.7 shows the responses to the questionnaire item.

**Table 4.7: Construction Design changes at implementation stage**

<b>Changes</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	32	89
No	4	11
<b>Total</b>	<b>36</b>	<b>100</b>

Of the total respondents a huge majority 32 (89%) indicated there changes in construction designs. The observation was also made by Aftab (2012) who says that frequent design changes is a common practice which is a major inhibiting factor in successful completion of projects.

### 4.3.2 Reasons for Changes in Construction Designs

The study also set out to establish reasons for changes in construction designs. Table 4.8 illustrates the responses by the study sample.

**Table 4.8: Causes for changes in construction designs**

<b>Cause for design change</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Request by client	10	28
Delay in final designs completion	0	0
Changes in funding levels	22	62
Changes in scope of works	3	8
Defects in designs	1	2
<b>Total</b>	<b>36</b>	<b>100</b>

With regard to construction design changes, the study found that 22 (62%) respondents indicated changes in funding levels occasioned the said changes. 10 (28%) respondents said design changes were as a result of request from clients while only 3 (8%) and 1 (2%) indicated design changes were as a result of changes in scope of works and defects in designs respectively.

#### **4.3.3 Influence of changes in construction designs on effective construction project Implementation**

The study asked the respondents to rate the extent to which changes in construction designs influence the effectiveness of construction project implementation. The areas that were rated as being influenced by the design changes were: Delay in Project commencement, Project costs variations/ overruns, Project completion delay and Project quality Control. Likert scale for rating was used as follows ; Major Effect = 5 ; Average Effect = 4 ; Small Effect = 3 ; No Effect = 2 ; Not Sure = 1. The ratings are analyzed as shown on Table 4.9.

**Table 4.9: Influence of Changes in Designs on Effective Construction Projects Implementation**

<b>Influence on</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Delay in project commencement	36	3.53	1.207
Project Costs variations	36	3.94	1.105
Project Completion delay	36	3.72	1.223
Project Quality Control	36	2.83	1.050

The study indicates that the rating of influence of changes in designs on project cost variations for effective construction projects implementation was ranked highest with a mean of 3.94 and a standard deviation of 1.105, Project Completion delay was ranked second with a mean of 3.72 and a standard deviation of 1.223. Delay in project commencement was rated third with a mean of 3.53 and a standard deviation of 1.207 while project quality control was ranked lowest with a mean of 2.83 and a standard deviation of 1.050. The results are consistent with a study by Ameh (2011) where he observed that design changes during project execution causes time overruns hence completion delay whose mean ranking rate was 3.70.

#### **4.4 Influence of Contractors Selection process on effectiveness of Implementation Construction projects**

Contractors selection process has influence on effectiveness on implementation of construction projects.

##### **4.4.1 Tender Evaluations Process**

The respondents were asked to indicate who undertakes Tender Evaluation for construction projects and the results are as shown in Table 4.10.

**Table 4.10: Tender Evaluations done by clients, consultants or consultants and clients**

<b>Respondent</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Clients	4	11
Consultants	6	17
Consultants and Clients	26	72
<b>Total</b>	<b>36</b>	<b>100</b>

From table 4.10, 26 (72%) respondents indicated that tender evaluations are undertaken by both consultants and clients. Only 4 (11%) and 6(17%) of the respondents said that tender evaluations are undertaken by clients and consultants respectively.

#### **4.4.2 Factors influencing the selection of a contractor in a construction project**

The respondents were asked to rate the extent to which the following factors influenced selection of a contractor to undertake construction project. The selection of a capable contractor who guarantees delivery of the project would be procured when the process of tender evaluation is undertaken under the prescribed professional criteria. The criteria indicated in the questionnaire were; Contractor's financial capacity; Technical capacity; Contractor's Bid/ lowest bidder, Past experience ó size and type of projects, Past relationship with clients/ contractors and Management resource ó formal and informal. Likert scale of rating used was: Very Great = 5; Great = 4; Minor = 3; No. Effect = 2; Not Sure = 1.

**Table 4.11: Contractors' selection factors influence on project implementation**

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<b>Factor</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Contractor's financial capacity	36	4.520	0.842
Technical capacity	36	4.472	0.764
Contractor's Bid/ lowest bidder	36	4.056	0.996
Past experience (size and type of projects)	36	4.361	0.856
Past relationship with clients/ contractors	36	3.361	1.378
Management resource	36	3.194	1.222

---

From the study the respondents ranked contractor's financial capacity as the highest with a mean rate of 4.52 and a standard deviation of 0.842, Technical capacity as a factor was ranked second with a mean rate of 4.472 and a standard deviation of 0.764. Past experience both size and type of projects was ranked third with a mean rate of 4.361 and a standard deviation of 0.856 and contractor's bid/lowest bidder was ranked fourth with a mean rate of 4.056 and a standard deviation of 0.996. Past relationship with clients/ contractors was ranked fifth with a mean rate of 3.361 and a standard deviation of 1.378 while management resource was ranked lowest with a mean rate of 3.194 and a standard deviation of 1.222. The results of the study are supported by Antohie (2009) who says improper selection of contractors occurs when they are selected as a result of the proposed bids and negotiated and not as a result of professional experience and technical ability to achieve the construction works. When this happens, the result is depicted in terms of implementation delays and additional costs due to non quality.

#### **4.5 Project Funding Levels**

In project funding, the study looks at funding influence on effectiveness on construction projects implementation.



#### 4.5.1 Project funding influence on effective construction project implementation

The respondents were asked to indicate whether project funding level influences effective construction projects implementation and the results are shown on Table 4.12.

**Table 4.12: Project funding influence on effective construction project implementation**

<b>Funding Influence</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	36	100
No.	0	0
<b>Total</b>	<b>36</b>	<b>100</b>

The study found that project funding level influences effective construction project implementation as all the respondents i.e. 36 (100%) were in consensus on this factor. This is consistent with Rahman (2013) study and he says financial stability of contractors and adequate cash flow is very critical in keeping construction progress as planned.

#### 4.5.2 Rating Funding Levels influence on project implementation

The respondents were asked to rate the funding levels influence on project implementation. The study undertook to investigate the following funding levels factors influence on effective project implementation: Sufficiency in funding; Absorption of allocated funds; Contractor financial capacity; late payments to contractors and Irregular funds disbursements. The Likert scale ratings were: Very great = 5; Great = 4; Minor = 3; No Effect = 2; Not Sure = 1. The results are indicated on Table 4.13.

**Table 4.13: Project Funding levels influence rating on effective project implementation**

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<b>Project funding level</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Sufficiency in funding	36	4.889	0.635
Absorption of allocated funds	36	3.833	1.214
Contractor's financial capacity	36	4.361	0.788
Late payments to contractor	36	4.472	0.765
Irregular funds disbursements	36	4.639	0.479

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The respondents ranked sufficiency in funding as the highest with a mean of 4.889 and a standard deviation of 0.635 and irregular funds disbursements with a mean of 4.639 and a standard deviation of 0.479 in second place. The respondents ranked late payments to contractors in third place with a mean of 4.472 and standard deviation of 0.765 and contractors financial capacity in fourth place with a mean of 4.361 and standard deviation of 0.788. Absorption of allocated funds was ranked lowest with a mean of 3.833 and standard deviation of 1.214. The outcome of the study agrees with Ameh (2011) in which he observed that inadequate funds for the project leads to time overrun thereby negatively impacting on construction project implementation. Adequate funding guarantees reasonable cash flow. There should, therefore, be effective funding of project by project owners to avoid unnecessary time overrun with its attendant effect on cost. The study results also agree with Tawil (2013) who observes that financial resources are the most prominent critical factors in effective project implementation. He states that insufficient capital and progress payment negatively affects progress of work in a construction site.

## 4.6 Project Cost Control

The respondents were requested to respond to aspects under project cost control on accuracy in preparation of project costs, budgets for construction projects and project costs control.

### 4.6.1 Preparation of accurate project costs

The study wanted to find out whether preparation of project costs in respect of construction projects is done accurately. The respondents' results are as shown in Table 4.14.

**Table 4.14: Project Costs preparation**

<b>Project Costs Preparation</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	26	72
No	10	28
<b>Total</b>	<b>36</b>	<b>100</b>

The study found out that an overwhelming 26 (72%) of the respondents indicated that accurate construction project costs are prepared. 6 (28%) of the respondents said that the project costs that are prepared are not accurate. This outcome is supported by Antohie (2010) who states that at the early stage of development of the construction project, cost estimate is needed to understand the financial feasibility of the project. The outcome is also consistent with Arafa (2011) who says early stage cost estimates plays a significant role in any initial construction project decisions and is crucial element of any construction project.

#### 4.6.2 Preparation of budgets for construction projects

The study set out to find whether budgets are prepared in respect of construction projects. Table 4.15 shows the results from the respondents.

**Table 4.15: Project Budgets preparation**

<b>Projects Budgets Preparation</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	29	80
No	7	20
<b>Total</b>	<b>36</b>	<b>100</b>

The study found out that an overwhelming 29 (80%) of the respondents indicated that construction project budgets are prepared while 7 (20%) indicated that they are not prepared. This is consistent with Antohie (2010) who says estimates of the budgets of the various stages of project implementation are prepared. These budgets are grouped in a cost plan which is a summary of all project costs for construction. Estimates made after start of actual implementation of the project are necessary for cost control.

#### 4.6.3 Adherence to budgets at implementation stage of construction projects

The study set out to find whether there is adherence to budgets during the implementation stage of the construction projects. The respondents were asked to rank the level of adherence. The Likert scale ratings were: Very High = 5; High = 4; Average = 3; None = 2; Not Sure = 1. Table 4.16 shows the results of the rankings from the respondents.

**Table 4.16: Project budgets adherence**

<b>Projects Budgets Adherence</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Very High	7	20
High	12	33
Average	17	47
None	0	0
Not Sure	0	0
<b>Total</b>	<b>36</b>	<b>100</b>

From Table 4.16, 7(20%) respondents indicated that adherence to project budgets is very high while 12(33%) rated it as high. 17 (47%) respondents ranked budgeting adherence at average level.

#### **4.6.4 Project Cost Control in construction projects**

The study set out to find whether project cost control is done in construction projects. Table 4.17 shows the results from the respondents.

**Table 4.17: Project Costs Control**

<b>Projects Costs Control</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	31	86
No	5	14
<b>Total</b>	<b>36</b>	<b>100</b>

The outcome of the study indicates 31 (86%) of the respondents said there are cost control measures during project implementation. Only 5 (14%) of the respondents said that there are no cost control measures. The study outcome is in agreement with Antohie (2010) study who observes that cost control programs estimating is required to facilitate the control of expenditure of funds on a project.

#### **4.6.5 Project Cost control influence on effective implementation**

The respondents were asked to rate the project cost control influence on effective project implementation. The study undertook to investigate the following project cost control factors influence on effective implementation of construction projects: Project Estimates; Project Budgeting; Cost Variances/ Financial appraisals. The ratings were: Very great = 5; Great = 4; Minor = 3; No Effect = 2; Not Sure = 1. The results are indicated on Table 4.18

**Table 4.18: Project Cost Control influence on project implementation**

<b>Project Cost Control</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Project Estimates	36	4.667	0.743
Project Budgeting	36	4.611	0.756
Cost Variances/ Financial Appraisal	36	4.389	0.657

From the study the respondents ranked project estimates preparation as the highest with a mean rate of 4.667 and standard deviation of 0.743, Project budgeting was ranked second with a mean rate of 4.611 and standard deviation of 0.756 while cost variances/ financial appraisals was ranked lowest with a mean rate of 4.389 and standard deviation of 0.657. The outcome of the study is consistent with the results of Challal (2012) who observed in his study that the most serious deadline slippages are due to, among others, errors in the estimate of the initial budget assessment with criticality of 100 and was ranked 1.

#### **4.7 Project Scheduling**

Construction projects have definite start and a determined finish date hence the essence of project scheduling for purposes of planning for material resources, plants and equipments, manpower as well as financial resources. Project Scheduling guides and assists in planning at what specific dates the aforementioned resources will be required to be sourced and procured to forestall unnecessary delays and stoppages of works on site.

#### 4.7.1 Project Duration Estimation

The study investigated whether project duration estimation is done in respect of construction works. The respondents were asked to indicate whether duration estimation is carried out. Table 4.19 shows the results as obtained from the respondents.

**Table 4.19: Project Duration Estimation**

<b>Duration Estimation</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	31	86
No	5	14
<b>Total</b>	<b>36</b>	<b>100</b>

From table 4.19, 31 (86%) respondents said that project duration estimation is normally done while only 5 (14%) of the respondents said the same is not done. In his study outcome, Memon (2011) noted that unrealistic contract duration is most significant and common factor affecting construction work in terms of cost.

#### 4.7.2 Tools and Techniques of Project Scheduling in Construction Projects

The following tools and techniques are applied during project scheduling and the respondents were asked to state which specific one are employed in the construction projects from amongst the following: Narrative Scheduling; Linear Scheduling; Gantt Charts/ Bar Charts; Critical Path Analysis and finally Program Evaluation and Review Techniques. The results of the outcome are shown in Table 4.20.



**Table 4.20: Project Scheduling Tools and Techniques**

<b>Projects Tools and Techniques</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Narrative	6	18
Linear	4	11
Gantt Charts	12	33
Critical Path Analysis	7	19
Program Evaluation and Review Techniques	7	19
<b>Total</b>	<b>36</b>	<b>100</b>

From the outcome of the study, 12 (33%) of the respondents ranked Gantt/ Bar Charts highest as the tool and technique employed in project scheduling. This was followed by both Critical Path Analysis (CPM) and Program Evaluation and Review Techniques (PERT) each with 7 (19%) of the respondents. Narrative scheduling was ranked fourth with 6 (18%) of the respondents. Linear scheduling as a project scheduling tool and technique was ranked lowest with 4 (11%) of the respondents. The results are in agreement with the study of Sawalhi (2012) who observed that Gantt chart is the most widely used tool because of its simplicity and applicability in all phases. However the study outcome is inconsistent with Sawalhi (2012) result stating that the use of networks i.e. CPM and PERT is considerably low.

#### **4.7.3 Project Scheduling influence on effective construction project implementation**

The respondents in this study were asked to rate the influence of project scheduling on effectiveness in construction projects implementation. The analysis of the results is shown on Table 4.21.

**Table 4.21: Project scheduling influence on project implementation**

<b>Project Scheduling</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Very High	12	33
High	21	58
Minor	2	6
No Effect	0	0
Not Sure	1	3
<b>Total</b>	<b>36</b>	<b>100</b>

From Table 4.21, 12 (33%) respondents indicate project scheduling has very high impact on effective project implementation. There are 21 (58%) respondents who believe project scheduling has high influence on effective project implementation while only 2 (6%) indicated that project scheduling has minor influence on effective project implementation. 1 (3%) respondent was not sure whether project scheduling has any influence on effective project implementation. The results are consistent with Memon (2011) findings who stated that contract duration is very important factor for success of any project as it ensures the completion of any work within the estimated time and cost. If contract duration is not estimated correctly, project might delay resulting in cost overruns hence affecting project implementation negatively. Challal (2012) made similar observations that error in scheduling, in piloting and coordination during the construction stage leads to serious deadline slippages and hence influencing project implementation.

#### **4.8 Influence of study variables on the effectiveness of construction project Implementation**

The variables of this study were: Changes in construction designs, Contractors Selection Process, Project Funding Levels, Project Cost Control and Project Scheduling. The respondents were

requested to rate the variables influence on effectiveness of Construction projects implementations. The rate for scoring ranged from 5 (Very Great), 4 (Great), 3 (Minor), 2 (No Influence) and 1 (Not Sure) on the Likert Scale. The method used to analyze data of study variables influence on effectiveness of implementation of construction projects is the Relative Importance Index (IIR). This index quantifies the relative importance of the study variables as were outlined in the introduction chapter that is: Changes in construction designs, Contractors selection process, project funding levels, project cost control and project scheduling mechanisms. It is calculated as follows:

$$IIR = \frac{\sum_{i=1}^{i=A} n_i \times i}{A \times N}$$

$n_i$ : the number of respondents having given a rating of  $i$  to the variable in question.

$A$ : the highest rating that is 5 in this case.

$N$ : the total number of respondents.

This relative importance index varies between 0 and 1.

**Table 4.22: Relative Importance Index analysis of influences of study variables on effectiveness of implementation of construction projects.**

<b>Weights Variable</b>	<b>Very Great (i=5)</b>	<b>Great (i=4)</b>	<b>Minor (i=3)</b>	<b>No Effect (i=2)</b>	<b>Not Sure (i=1)</b>	<b>N</b>	<b><math>\sum in_i</math></b>	<b><i>IIR</i></b>
Construction Design changes	8	12	8	5	3	36	125	0.6944
Contractors Selection process	16	10	5	3	2	36	143	0.7944
Project funding	22	11	2	0	1	36	161	0.8944
Cost Control	24	11	0	0	1	36	165	0.9167
Project Scheduling	12	21	2	0	1	36	151	0.8389

From table 4.22, the respondents indicated project cost control has the highest influence on effective implementation of construction projects the highest with IIR of 0.9167. Project funding was second following very closely with IIR of 0.8944. Project scheduling was third with IIR of 0.8389 while contractors selection process was fourth with IIR of 0.7944. Construction design changes were ranked lowest with IIR of 0.6944.

#### **4.9 Summary of Data Analysis**

With a response rate of 97.00 %, the respondents indicated that Project Cost Control is the most influential factor in the effectiveness of construction project implementation. The relative importance index of project cost control on influence of effectiveness in construction project implementation was 0.9167 which implies strong influence. This factor is closely followed by the

Project Funding Levels factor which had a relative importance index of 0.8944. When it comes to the details of the cost control factor, 86% of the respondents said project cost control is normally done during construction project implementation while 80% said that project budgets for construction contracts are prepared to assist the project implementation process. 72% of the respondents indicated that project costs estimates are prepared for construction projects before commencement.

All the respondents said project funding is a critical factor in the influence of effectiveness of construction project implementation. Sufficiency of project funds was rated at a high mean rate of 4.889 by the respondents while irregular funds disbursements influence on effectiveness of implementation was mean rated at 4.639. Although 89% of the respondents indicated that there are normally changes in construction designs during implementation mainly due to changes in funding levels as indicated by 62% of the respondents, the influence of this factor was ranked lowest at a mean rate of 3.47. Changes in construction designs influence on project quality control was rated at mean value of 2.83 on the Likert scale.

## CHAPTER FIVE

### SUMMARY OF THE FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS OF THE STUDY

#### 5.1 Introduction

The following chapter presents a summary of the study findings and comes up with conclusions based on the outcome of the data collected and analyzed. In the chapter, recommendations to the Government and other stakeholders in the construction industry will be made on a number of aspects within the industry that require to be addressed so as to facilitate effectiveness in projects delivery to the satisfaction of the clients and other beneficiaries. Further research areas will also be outlined in this chapter.

#### 5.2 Summary of Findings

Respondents of the study comprised consultants, contractors and clients. The outcome shows that on the issue of gender, the industry is male dominated implying gender imbalance. The respondents had attained high education at the level of degree and above, the consultants occupying the highest percentage of 36% in comparison to the clients 30% and contractors 17%. The response rate of 97 % was considered very adequate for the study. The study investigated the influence of changes in construction designs, contractors selection process, project funding levels, project cost control mechanisms and project scheduling on the effectiveness on implementation of construction projects. The Relative importance index of influence of changes in construction designs on effectiveness on project implementation was lowest 0.6944 while project cost control, project funding levels, project scheduling and contractors selection process relative importance index on influence on effectiveness were 0.9167, 0.8944, 0.8389 and 0.7944 following one another in that order.

### 5.3 Discussion of the Findings

The study findings show changes in construction designs influence effectiveness in construction project implementation. This is consistent with Aftab (2012) findings who say frequent design changes commonly practiced is a major inhibiting factor in achieving successful completion of projects. He continues to observe that a major contributor to poor performance in projects is design and documentation issues, project management and contract administration. The same is supported by Muhamad (2011) who says construction design changes and issues cause delays in construction projects. Those issues include inaccuracies, incomplete drawings leading to design changes and late engineering.

Contractors Selection process is another factor that was found to have its share of influence on effectiveness in implementation of construction projects. Xiaohong (2011) concurs on this factor and observes that construction contractors have big influences upon projects and their successes and says it's therefore very critical to select a qualified contractor. Mike (1998) agrees and says the client may in addition want assurance from the tenderers (contractors) on the contractors' financial stability, technical capacity, experience and management experience.

The study, too, found project funding levels factor influences effectiveness of projects implementation. Funding facilitates operations of the project and mode of financing the construction project influences effectiveness of implementation. Inadequate funding or lack of it negatively impacts on the implementation of the project since no operations can continue which in most cases leads to extended contract periods and escalation of contract sums, claims on interest on delayed payments, fluctuation of materials and labour prices, claims on loss of profit and idle plants and equipments. These findings are in agreement with Rahman (2013) who observed financial stability of contractors and adequate cash flow is critical in keeping construction progress as planned. Ameh (2011) says that inadequate funds lead to time overrun and adequate funding guarantees reasonable cash flow. There should, therefore, be effective funding of project by project owners to avoid unnecessary time overrun with its attendant effect on cost

The study has established that Project Cost Controls influences effectiveness of implementation of construction projects. The mean rate for this variable was ranked highest. This agrees with Griffin (2010) who noted every project has a limited budget and there is a point beyond which there are no remaining resources to fund the work of the project. He continued to say that measures to make certain the cost estimates for the project are reasonable and acceptable should be taken.

On the factor of Project scheduling, the findings indicate the factor has influence on effectiveness of implementation of projects. Memon (2011) makes similar findings and says unrealistic contract durations in project scheduling are significant and common factors affecting construction work in terms of cost. Challal (2012) adds and says error in scheduling, in piloting and coordination during the construction stage leads to serious deadline slippages and hence affecting project implementation.

#### **5.4 Conclusions of the study**

The construction industry is a major component, a key contributor and major player in the economic development of any given economy. It provides numerous employment opportunities to the skilled, semi skilled and unskilled segments of society's labour force, offers market for construction materials hence uplifting living standards to many people and provides the infrastructural platform for further economic development. Due to numerous advantages derived from the industry to the economy, it is critical and imperative to facilitate its effectiveness in performance and delivery. The study has revealed the factors the industry faces as hindrances in its endeavor to effectively deliver on projects in terms of time, costs, specifications and clients expectations.

Project cost control functions need to be up scaled over the entire life of the project and more at implementation. In addition project funding aspects need to be implemented right from the project initiation stages through completion and closure. Project scheduling functions should be carried out early enough and should be as realistic as they can. Contractors' selection process should be carried out incorporating all the necessary professional expertise by experienced construction industry experts so as to ensure the best and most competent contractor for the project in question is



procured and awarded the contract. Constant changes in construction designs should be reduced as much as is practicable.

## **5.5 Recommendations of the study**

Clients and stakeholders in the construction industry invest huge sums of capital into construction projects with expectations of getting value for their money from the final product. In other words, clients and stakeholders have high expectations. Further, the construction industry entails and consumes huge figures in terms of finances, materials, human capital and technology. The economic benefits that are derived from very efficient construction sector that is delivering are numerous both to the investors, developers and the country in general. The need for effectiveness and efficiency of the construction industry, therefore, cannot be overemphasized. It is surprising to note that the sector is one of the key indicators of economic development of a country.

The construction industry within the public sector in Kenya has had its fair share of ineffectiveness leading to non delivery as is evidenced by the many projects that have cost and time overruns as well as quality issues. Rarely is construction projects completed practically within the original contract period and original contract sums. In most cases, quality of the final product is below expectations rendering the client and other stakeholders dissatisfied. The study suggests areas that need to be addressed in order to alleviate the current situation in order to deliver projects that meet clients expectations hence a satisfied customer.

The study suggests the need to apply all the project cost control mechanisms proactively. First and foremost, accurate and realistic preliminary estimates should be prepared by professionals like the Quantity Surveyors, Cost Engineers, Mechanical and Electrical Engineers. This process should be undertaken even as the developments of designs unfold. The information so arrived at should be communicated to the client and developer in order to confirm availability of funding. Alternatively, designs should be developed bearing in mind the allocated amount of funds for the specific projects a process known as designing to cost. This forestalls a situation of designing projects whose scope is beyond the funds available or allocated.

The other issue is budgeting. Project budgets should be prepared and this should depict the approved financial plan of the operations, indicating the amounts required for achieving assigned targets and the expected value of the work. Variance Analysis and financial appraisals should form a critical component of the contract management and administration. Other cost control tool like Earned Value Analysis when applied in construction projects assists to determine the cost performance of a project.

The study suggest that clients or developers, once they receive communication regarding cost estimates of the proposed project, should without delay confirm availability of adequate funds to undertake the project and in what arrangement the funds will be forthcoming. The client should facilitate adequate and sufficient funds to the project and ensure he deals with unexpected delay in payments to the contractors as work progresses on site. This enables contractors to organize their operations and activities as well as prepare the projects cash flow requirements.

The study suggests that Project scheduling should entail as realistic time period as is practicable for the duration required constructing the project. The project schedule should bear in mind the list of resources i.e. work force, materials, machines since they correspond to the project. Different program scheduling tools should be applied depending on the size, nature and complexity of the project. CPM scheduling tool should be applied where there is ability to identify the critical path or the longest path of work through the network which predicts the earliest date that the project can be completed. PERT would best be suited in highly uncertain individual activity durations estimate. Bar/ Gantt charts are good tools in scheduling of small projects which are not complicated and can be the best visualization form of any size projects.

With regard to Contractors selection process, the study suggests Pre- qualification Method. This model evaluates contractor's competence which ensures only quality contractors are invited to participate in the bidding process for the project. Multi Criteria Evaluation Model is another one suggested for contractor's selection. The model entails consideration of many important contractor's attributes like competence and sufficiency of contractor in financial capacity, bid price/cost, technical capacity, managerial ability, past experience in terms of size and complexity of projects and current workload.

On the aspect of constant changes to construction designs, the study suggests that this should be kept to the minimum possible number. This can be achieved through allocating sufficient and reasonable time period for development of construction designs. The clients should be clear in their minds what they intend to develop and hence provide sufficient briefing details to the consultants (Architects, Engineers and Quantity Surveyors) who have been engaged to undertake the construction designs. Approvals of the designs with the clients and other relevant stakeholders should be obtained before commencement of implementation of the project. If changes to construction designs are inevitable, then the financial as well as time extension implications should be quantified as soon as is practicable and the same approved. In addition, the clients should confirm that they engage and consult the services of qualified persons to undertake the construction designs. This would ensure quality construction designs are provided and adopted in construction sites. Short cuts in approvals, in supervision of ongoing projects should also be discouraged and adherence to specifications is suggested so as to guarantee high quality end product that is satisfactory to the clients and other stakeholders in general.

## **5.6 Suggestions for further Studies**

Research is a continuous process and hence the need to study further. This will contribute further to enhancement of effectiveness of this very important sector of the economy. In the study, issues of changes in construction designs, contractors selection process, project funding levels, project cost control and project scheduling were addressed. The study was therefore not exhaustive with regard to factors influencing effectiveness of implementation of construction projects and recommendation for further research in this area is necessary. Such a study would go a long way in identifying many challenges and constraints the construction industry encounters in its endeavor to become efficient and effective. The areas include;

1. Study into the effectiveness of quality management principles in public construction Industry.
2. Investigation into the effectiveness of approval policies and procedures in implementation of public construction industry.

3. The effectiveness of construction project management in the public construction industry.
4. Investigation into the level of clients' contribution towards successful public construction projects.

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**APPENDICES**

**APPENDIX 1**

**LETTER OF TRANSMITTAL**

**DAVID MWAI KOGI,  
P.O. BOX 7338-00200,  
NAIROBI.**

Dear Sir/Madam,

**Re: Factors influencing the effectiveness of implementation of the Economic Stimulus Programme, the case of construction projects in Nairobi County, Kenya**

I am a Master of Arts (Project Planning and Management) student at the University of Nairobi-Nairobi Extra Mural Centre. My Registration Number is L50/68576/2011. I am conducting a study on Factors influencing the effectiveness of implementation of the Economic Stimulus Programme, the case of Construction Projects in Nairobi County.ø

You have been randomly selected to assist in the study by way of participating in answering the questionnaire. You are kindly requested to respond to all the questions as this will be very useful to this study.

I take this opportunity to assure you that all personal details will be treated with utmost confidentiality and will therefore not be divulged to anyone whatsoever.

Thank you for your participation.

**David Mwai Kogi**

## APPENDIX 11

### QUESTIONNAIRE FOR STAKEHOLDERS IN ESP CONSTRUCTION PROJECTS

This questionnaire is to be completed by stakeholders i.e. clients, consultants and contractors involved in ESP construction projects. It seeks to investigate the factors influencing effectiveness in implementation of ESP construction projects.

Kindly answer all questions as honestly and as fully as you can.

#### **SECTION A**

##### **Background Information**

Demographic: Choose the suitable answer and tick (ç) the option that is most appropriate to you.

##### **1. Gender**

Male

Female

##### **2. Age**

20 ó 29 yrs

30 ó 39 yrs

40 ó 49 yrs

50 ó 59 yrs

60 yrs & above

**3. Highest education qualification**

Certificate	<input type="checkbox"/>
Diploma	<input type="checkbox"/>
Degree	<input type="checkbox"/>
Masters	<input type="checkbox"/>
PhD	<input type="checkbox"/>
Other (please specify)	_____

**SECTION B**

**PART B: Construction designs changes**

**Q4.** Were there changes in construction designs in the ESP construction projects at implementation stage?

<b>Yes</b>	<input type="checkbox"/>	<b>No</b>	<input type="checkbox"/>
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**Q5.** What were the reasons for changes in construction designs?

Request by Client	<input type="checkbox"/>
Delay in completion of final designs	<input type="checkbox"/>
Changes in funding levels	<input type="checkbox"/>
Changes in scope of the works	<input type="checkbox"/>
Defects in designs	<input type="checkbox"/>

**Q6.** In your opinion do you think the changes in construction designs affected effectiveness of project implementation?

**Yes**  **No**

**Q7.** Did the changes in construction designs affect the original project completion period?

**Yes**  **No**

**Q8.** Did the changes in construction designs result in variations in final project costs?

**Yes**  **No**

**Q9.** Kindly rate the extent to which changes in construction designs affect the effectiveness of construction project implementation

**Major Effect = 5; Average Effect = 4; Small Effect = 3; No Effect = 2; Not Sure = 1**

<b>Construction design changes</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Delay in Project commencement					
Project costs variations/overruns					
Project completion delay					
Project quality control					

**PART TWO: Contractors Selection Process**

**Q10.** Have you been involved in the tendering process for procurement of Contractors for execution of construction projects?

Yes  No

**Q11.** Who undertakes Tender Evaluation for Construction Projects?

Client

Consultants

Consultants and Client

**Q12.** In your view are tenders evaluated objectively as per the provided criteria for construction projects and eventual contractor selection?

Yes  No

**Q13.** Kindly rate the extent to which the following factors contribute to the selection of a contractor to undertake construction project

**Major factor = 5; Average factor = 4; Minor factor = 3; Not a factor = 2; Not Sure = 1**

<b>Contractors selection process</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Contractorø Financial Capacity/standing					
Technical Capacity					
Contractorø Bid/ Lowest Bidder					
Past Experience ó Size and Type of Projects					

Past relationship with clients/ contractors					
Management Resource- formal and informal Training					

**PART THREE: Project Funding levels**

**Q14.** Do you think Project funding level is a critical factor in effective construction project implementation?

Yes  No

**Q15.** Describe the magnitude/extent of Project funding levels in the construction projects you have been involved in:-

- Sufficient Funds
- Intermittent Funding
- Funding in Phases
- Insufficient funding

**Q16.** To what extent would you rate the following factors' impact on project implementation?

**Very Great = 5; Great = 4; Minor = 3; No Effect = 2; Not sure = 1**

<b>Project Funding Levels</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Sufficiency in funding					
Absorption of allocated funds by stakeholders					
Contractor financial capacity					
Late payments contractors					
Irregular funds disbursements					

**PART FOUR: Project Cost Control**

**Q17.** Is project cost estimates prepared in respect of construction projects before commencement?

Yes  No

**Q18.** Who prepares estimates of construction project?

Client

Consultant (QS/Engineer)

Contractor

**Q19.** In your view are construction project costs accurately and professionally prepared?

Yes  No

**Q20.** Are project budgets prepared in respect of construction projects?

Yes  No

**Q21.** How do you rate the level of adherence to project budgets during construction project implementation?

Very High

High

Average

None

Not sure

**Q22.** Is project cost control practiced during project implementation?

Yes  No

**Q23.** To what extent do the following factors of project cost control impact on effectiveness in project implementation?

**Very Great = 5; Great = 4; Minor = 3; No Effect = 2; Not sure = 1**

<b>Project Cost Control mechanisms</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Project estimates					
Project budgeting					
Cost variances/financial appraisals					

**PART FIVE: Project Scheduling**

**Q24.** Is Project duration estimation done in respect of construction projects?

Yes  No



**Q25.** What are the techniques and tools employed in project scheduling for construction projects?

Narrative scheduling

Linear scheduling method

Gantt Charts/Bar charts

Critical Path Analysis

Program Evaluation and Review Techniques

**Q26.** How realistic is the estimation of the project duration

Very Realistic

Realistic

Average

Unrealistic

Very unrealistic

**Q27.** Kindly rate the extent to which project scheduling influence effectiveness in implementation of construction projects

**Very High = 5; High = 4; Minor = 3; No Effect = 2; Not sure = 1**

Very High

- High
- Minor
- No effect
- Not sure

**Q28.** Kindly rate the influence of the following aspects on effectiveness in project implementation

**Very Great = 5; Great = 4; Minor = 3; No Effect = 2; Not sure = 1**

Aspects	5	4	3	2	1
Changes in Construction designs					
Contractor Selection process					
Project Funding Levels					
Project Cost Control					
Project Scheduling					

Thank you for your cooperation.

**APPENDIX 111**  
**KREJCIE AND MORGAN SAMPLE SIZE TABLE:**  
**TABLE FOR DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION**

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

**Note: “N” is population size      “S” is sample size**

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