FACTORS THAT INFLUENCE SUCCESS IN LARGE CONSTRUCTION PROJECTS: THE CASE OF KENYA URBAN ROADS AUTHORITY PROJECTS

BY

LEPARTOBIKO WILSON

A PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF ARTS DEGREE IN PROJECT PLANNING AND MANAGEMENT, UNIVERSITY OF NAIROBI

2012

DECLARATION

This research project report is my original work and has not been presented for the award of a degree in any other University.

Signed ..... Date 16/11/2012.....

LEPARTOBIKO WILSON

L50/71812/2008

This research project report has been submitted for examination with my approval as the University Supervisor.

Signed ..... Date 16/11/2012

DR. CHRISTOPHER GAKUU

SENIOR LECTURER, DEPARTMENT OF EXTRA-MURAL STUDIES

UNIVERSITY OF NAIROBI

DEDICATION

This work is dedicated to the memory of my Dad Stephen L. Lepartobiko and my late brother John Lepartobiko and to my entire family, for their support.

ACKNOWLEDGEMENTS

It gives me immense pleasure to acknowledge my heartfelt thanks to my supervisor, Dr. Christopher Gakuu of the University of Nairobi's Extra Mural Centre, under whose professional guidance I successfully completed my M.A. research work. It was indeed a privilege to work with him. We started the journey together.

In addition, I would like to thank Eng. J. N. Nkadayo, Director General KURA for facilitating my Research Project. Last but not least, I reserve my special thanks for my wife Pauline N. Lenamunyi and son Martin Ian. Pauline always encouraged me to finish and never to give up. They endured my long study hours both at night and during the day.

TABLE OF CONTENT

LIST OF TABLES

Page

LIST OF FIGURES

LIST OF ABBREVIATIONS

BOT	-	Build operate-transfer
CSC	-	Contractor Selection Criteria
CSFs	-	Critical Success Factors
KFI	-	Key Factor Index
KNBS	-	Kenya National Bureau of Statistics
KPIs	-	Key performance indicators
KURA	-	Kenya Urban Roads Authority
MIS	-	Management Information System
PFI	-	Project Finance Initiative
PM	-	Project Management
PMI	-	Project Management Institute
PSFs	-	Project Success Factors
SPSS	-	Statistical Package for Social Science

ABSTRACT

Project management as a management discipline is relatively new, and more so complex and dynamic. The knowledge gap that exists within the profession has been the greatest undoing in managing projects. However, it is premised that the clear understanding of such critical missing information, will enable successful management of projects. Generally, past industry experiences show that, medium to large size projects have high failure rate. The consequences can be costly and lengthy, with the worst outcomes often leading to undesirable litigation engagements. Developing Countries have higher rate of low project performance than developed countries. The broad task of this study was to identify and analyze the key factors that influence success in large construction projects with reference to Kenya Urban Roads Authority projects. This research adopted a descriptive survey. The target projects in this study consisted of all KURA construction projects with total budget greater than One million US dollars ($ 1 Million), which were assumed to be large projects in this research, undertaken from the year 2008 to 2012. The target population of the study was 125 senior managers of the construction companies, client representatives and the consultants. Purposive sampling was used to select 94 respondents. This study was carried out using structured questionnaire. The researcher analyzed the quantitative data using descriptive statistics by applying the Statistical Package for Social Science (SPSS V.19.0). In addition, Spearman's rank correlation was used to calculate the average ranking of the factors. For a project to be successful there must be an improved appreciation of the role of project management within projects. Quality can be assured by identifying and eliminating the factors that cause poor project performance. Thus, project managers need better understanding of critical success/failure factors and how to measure them. The analysis of the information gathered from the questionnaire survey was discussed in chapter four and includes the identification of the critical success factors based on the factors checklist. The analysis and discussion about the questionnaire survey is organized in seven factors' categories. The critical success factors are presented in Tables 4.6 – 4.13. Each Table organizes each category of factors (Business related, Project procedures factors, Project Management Factors, Client-Related-related Factors, Design Team-related Factors, Contractor-related factors and Project Manager-related factors).

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The construction industry is an important part of the economical backbone in many countries (Ngai *et al.*, 2002), often accounting for between 7-10 percent of the Gross Domestic Product (Winch, 1996, Voordijk *et al.*, 2000). The construction industry is considered to be one of the most important industries in an economy, as it interacts with nearly all fields of human endeavour. In many countries the construction industry has, however, attracted criticism for inefficiencies in outcomes such as time and cost overruns, low productivity, poor quality and inadequate customer satisfaction (Ericsson, 2002, Chan *et al.*, 2003).

A construction project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment. The complexity, uncertainty and dynamics of most construction projects create difficulties for even the best project managers. Construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants, stakeholders, shareholders and regulators (Navon, 2005). Decision milestones are used to anticipate outcomes, risk management is done to prevent disasters and sequential iteration is employed to ensure that the desired facilities are available, yet projects still end up with schedule delays, budget overruns and compromised specifications (Meyer et al., 2002). Over time, projects have proved to be the drivers of business, investment and overall development.

According to Pinto (1986), the project implementation process is complex, usually requires extensive and collective attention to a broad aspect of human, budgetary and technical variables. In addition, projects often possess a specialized set of key success factors in which if addressed and attention given will improve the likelihood of successful implementation. Meaning certain factors are more critical to project success than others. On the other hand, if these factors are not taken seriously, might lead to the failure of the

project. This has led to the birth of body of knowledge referred to as Project Management (PM).

The Project Management Institute (PMI) defines PM as "the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, quality and participant satisfaction". PM as a management discipline underpins much economic activity. PM, therefore, is emphasized as the process of making decisions and operationalising certain strategies and tactics to bring the project to success. With PM, most construction projects are successfully executed. According to Mobey and Parker (2002), to increase the chances of a project succeeding, it is necessary for an organization to have an understanding of what are the key success factors, to systematically and quantitatively assess these key factors, anticipating possible effects and then choose appropriate methods of dealing with them. Once identified, the success of the project can be achieved. If project participants can predict probabilities of success better, they can take steps to: (1) Avoid unsuccessful projects; (2) identify good projects worth pursuing; and (3) identify problems on current projects and take correction actions.

Kenya has a dynamic economy: prior to December 2007 general elections, the economic growth rate was good, but due to political instability that started thereafter, and the current global economic recession, the Kenyan economic growth declined tremendously. As at now, the general economic outlook continues to improve albeit the slow pace (Economic Survey 2011, KNBS). The construction sector is among the key agents and contributors to growth accounting for 18.8% of the economy in 2010 (Economic Survey 2011, KNBS). However the management of construction projects has faced many difficulties leading to stalled projects. The success rate of many construction projects in Kenya is not encouraging. Consequently, the effectiveness of many projects has not been "visible". It is therefore imperative that PM should be improved in the Kenyan construction industry. In particular, the Kenya Urban Road Authority, with extensive road construction projects countrywide, requires good PM services so as to enable the provision of efficient and safe urban roads.

Roads among other transport and communication infrastructure is a key driver to development of nations as attested in the vision 2030. More so, road transport is the predominant mode of transport and carries about 93% of all cargo and passengers traffic in the country.

Different researchers have tried to determine the factors for a successful project for a long time. Therefore, the challenge of how to handle a Construction project successfully has attracted substantial research attention in the past couple of decades. Lists of variables have been abound in the literature; however, no general agreement has been made. This topic has since become a prolific research area since the study is valuable for professional, involved with PM services in general. Furthermore, because of pursuit of excellence in project delivery systems is not new, this research direction could thrive upon a rich legacy of many previous investigators. But, the concept of project success has remained ambiguously defined in the mind of the construction professionals, implying no agreement has been reached on the key project success factors although some variables are common to more than one list.

Consequently, this research is conducted in order to make an attempt to identify which variables influence the success of project implementation. The research is focused to the construction industry of Kenya. Based on the results of the survey, it is anticipated that patterns will emerge regarding the key performance indicators for measuring project success in Kenya's construction industry. These results could then be used in effecting successful projects.

1.2 Statement of the Problem

Project management as a management discipline is relatively new, and more so complex and dynamic. The knowledge gap that exists within the profession has been the greatest undoing in managing projects. However, it is premised that the clear understanding of such critical missing information, will enable successful management of projects. Therefore, the challenge of how to handle projects successfully has attracted substantial research attention in the recent past.

Minimal of knowledge on key project success factors leaves project managers guessing on how to deliver successful projects by navigating through the complex yet unfamiliar "terrain" of project management. This has led to either stalled or failed projects. Similarly, for the few projects that get completed, they are associated with; scope creep, cost overruns, poor workmanship or project time delays (Navon, 2005). Consequently, arising from creation of "white-elephant" projects, huge resources are wasted, business opportunities lost, customers get dissatisfied and the overall development is retarded among others.

Research reveals that construction projects do not succeed as initially planned due to the volatility and complexity of projects and its delivery mechanism. Generally, past industry experiences show that, medium to large size projects appear as the frequent victims because project complexity fluctuates proportionately with the increase in project size. The consequences can be costly and lengthy, with the worst outcomes often leading to undesirable litigation engagements. Developing countries have higher rate of low project performance than developed countries (Lim and Alum, 1995). Most researchers discussed the increased challenges and decreasing performance of the construction industry (Teicholz et al., 2001).

Anderson (1984) cited in Boynton and Zmund (1984) observed that key success factors can be used by managers and organisations to help achieve high performance. However, it is recognized that research on project success factors needs further efforts. Previous studies have presented either too general or too specific success factors that portends certain difficulties when applied in practice, especially in developing countries where management information system (MIS), including state-of the-art managerial skill is not available. Therefore, the success factors need to be clearly defined, so that they can be readily and consistently employed for future projects.

Evidences have proved most construction projects in developing countries suffer overrun in cost and time. Iyer and Tha (2006) revealed that 40% of Indian Construction projects are facing time overrun ranging from 1 to 252 months. Ugandan Construction Industry experiences cost and time overruns (Mubiru, 2001). Construction delay and cost overruns are cogitated as frequency project problems in Vietnam government-related funded projects

(Ministry of planning and investment, 2003). Whereas similar studies had been done in other parts of the world, there was need for studies that specifically target Kenyan context and in particular Kenya Urban Roads Authority projects.

1.3 The Purpose of the Study

The broad task of this study was to identify and analyse the key factors that influence success in large construction projects with reference to Kenya Urban Roads Authority projects.

1.4 Research Objectives

The following were the study objectives

1. To identify business-related factors that influence success of KURA construction projects
2. To establish the project procedures factors that influence success of KURA construction projects
3. To establish the project management factors that influence success of KURA construction projects
4. To identify human-related factors that influence success of KURA construction projects

1.5 Research Questions

1. Which business-related factors influence the success of the KURA construction projects?
2. To what extent do project procedures factors influence the success of the KURA construction projects?

3. To what extent do the project management factors influence the success of the KURA construction projects?

4. To what extent do the human-related factors influence the success of the KURA construction projects?

1.6 Significance of the Study

Construction projects in the Kenya suffer from many problems and complex issues in performance because of many reasons and factors. This study was aimed at identifying the project success factors in the KURA construction projects, and to uncover the underlying relationships between the independent variables and dependent variable identified in this research. The causal relationships, once identified, would be a useful piece of information to implement the projects successfully. This means, the findings would be useful to construction professionals operating in Kenya to put in place key factors that can lead to good project performance. For foreign practitioners entering Kenya's market, the study would assist them in focusing on the more important factors to achieve good project outcomes. The knowledge of project success criteria would help one avoid common problems that befall many project managers. The findings are focused to assist practitioners' gain better understanding on the key areas based on prioritized success factors in order to improve performance in project delivery.

For researchers and academicians, this research would enrich existing research on construction enterprises supply chain management applications in Kenya. The current research would provide theoretical references for establishing a set of effective mechanisms and methods for enhancing success of construction projects.

1.7 Scope of the Study

The scope of this study was limited to assessing the current state of Kenya's construction industry through quantitative research with specific reference to the key success factors.

The following sub-sector was chosen for the study;

1. The study mainly focused on KURA construction projects distributed all over the Country.

2. The study was limited to relatively large new construction projects with a minimum contract amount of Kshs 90 million.

1.8 Assumptions of the Study

The following were the study assumptions;

i. That the client, the contractor, the project consultants and the project manager are knowledgeable in project management;

ii. Other than project location, the rest of the external factors, such as materials and labour availability, remain constant;

iii. That a successful project can be defined as a project that has been completed on schedule, within budget, within scope and satisfied the required quality, instead of wholesome approach and;

iv. That the client, contractor and project manager have differing views in terms of project success.

1.9 Limitations of the Study

There were constraints to a thorough study, to come up with reliable and better conclusive results. The limitations of the study included;

i. Finance: The extensive study to cover sufficient number of projects requires substantial amount of money. Travelling, stationeries, payments to research assistants, photocopies among others consumed huge sums of money. Finances were limited thus restricting a thorough study.

ii. Another limitation of this study was the unit of analysis, which emphasized on a completed successful project. As the project has already completed, the project may be long overdue and respondents may not be able to recall completely their experience with the project.

iii. That the study was confined to large construction projects managed by KURA only. This limited other large projects in Kenya. Hence, generalization may be limited.

iv. Time: There was no sufficient time to undertake a thorough study that would have increased the precision of the findings.

v. Lastly, the final limitation observed during this study was the literature review material on success factors for construction projects was limited and majority of the literature found only confined to a general review of the success factors in various general industries particularly in the field of information technology.

1.10 Delimitation of the study

The study tried to overcome the above limitations by;

i. The sampling was done such that it was representative to the population;

ii. Recently completed projects were preferred compared to those completed over three or more years ago;

iii. Reasonable time was taken in undertaking the study.

1.11 Definition of key terms

Business related factors – these are external influences on the construction process including social, economic, political, and technical systems that affect the project success.

Construction - is a process that consists of the building or assembling of infrastructure.

Human-related factors - The aggregate of all human, physical and mental effort used in creation of goods and services required for project success. These include; Client, Design team, Contractor and Project manager related factors.

Key Performance Indicators (KPIs) - include factors such as time, cost, quality, client satisfaction; client changes, business performance and safety in order to enable measurement of project and organizational performance throughout the construction industry.

Key Success Factors - The factors/ element that are a necessary condition for success in a given market or for a project to achieve its mission.

Performance Measurement – this as an operational management accounting including financial and non-financial performance indicators. It is a process of re-thinking and re-evaluation of business processes to achieve significant performance improvements of projects.

Project - consists of a temporary endeavor undertaken to create a unique product, service or result.

Project Management Factors- is the discipline of planning, organizing, securing and managing resources to bring about the successful completion of specific project goals and objectives. For instance, communication system, planning, monitoring among others.

Project Management - The body of knowledge concerned with principles, techniques, and tools used in planning, control, monitoring, and review of projects.

Project procedures - A set of policies, principles, rules, and guidelines formulated or adopted by an organization to reach its long-term goals. They comprise the concept of procurement, form and the method of tendering.

Project Success – is achievement of an objective/goal of a Project

Project Success Factors - are inputs to the management system that lead directly or indirectly to the project success.

1.12 Organization of the Study

The study is organized into three chapters, each of which contains specific information. Chapter one contains the introduction to the study. It gives background of the study, statement of the problem, objectives of the study both general objectives of the study, specific Objectives of the study, research questions, significance of the study, limitations of the Study, delimitations of the study, basic assumptions of the Study and the definition of significant terms. On the other hand, chapter two reviews the literature based on the objectives of the study. It further looked at the conceptual framework and the theoretical review. Chapter three covers the research methodology of the study. The chapter describes the research design, target population, sampling procedure, tools and techniques of data collection, pre-testing, operational definition of variables, data analysis and ethical considerations. Chapter four deals with the data analysis, interpretation and findings while finally, chapter five includes summary of findings, discussions, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature review on factors that influence success in large construction projects. The literature discussed is a summary of research findings of other researchers who have carried out their research in the same field of study so as to provide a theoretical foundation underpinning the study variables. A discussion is made of the concept of project success criteria, a review of empirical studies on the various factors, conceptual framework and finally the research gap.

2.2 Project Success Criteria

A construction project is commonly acknowledged as successful when it is completed on time, within budget, and in accordance with specifications and to stakeholders' satisfactions. Functionality, profitability to contractors, absence of claims and court proceedings and "fitness of purpose" for occupiers have also been used as measures of project success (Takim and Akintoye, 2002). As mentioned above, these days organizations are project-based meaning that the work they do is split into programmes of projects designed to deliver the organization's strategies and add value. It is essential to identify and manage good projects. As PM Guru Bob Buttrick puts it, "Directing the individual project correctly will ensure it is done right"

Success criteria or a person's definition of success as it relates to a building often changes from project to project depending on participants, scope of services, project size, sophistication of the owner related to the design of facilities, technological implications, and varieties of other factors. Developing or identification of success factors has dominated the field of PM from 1980's to date. Many researchers have tried to a certain extent to identify success factors for PM. Among researchers are Kerzner (1987), Pinto and Slevin (1987), Pinto and Slevin (1989), Clarke (1999) Cooke Davis (2002) and Muller and Turner (2003).

From literature review, different studies have categorized the general success factors differently; One school of thought have classified them into five major groups of independent variables namely: Project-related factors, project procedures, project management actions, human-related factors, and external environment, while another group has categorized them into seven main categories: these include:- (1) Project management factors; (2) Procurement related factors,(3) Client related factors; (4) Design team-related factors; (5) Contractor-related factors; (6) Project manager-related factors; and (7) Business and work environment-related factors. Another research study grouped the factors into the following; Strategic, structural, technical and the managerial factors. The former school of thought that classified the success factors into seven major groups seems comprehensive enough and precise. Therefore, this report adopted it.

2.3 Key Factors for Project Success

Several researches on factors affecting construction project success have proposed either general factors (Sanvido et al., 1992) or specific factors (Chua et al., 1999). In building construction, Sanvido et al. (1992) found four CSFs: (1) a well-organized and cohesive facility team; (2) a series of contracts allowing to encourage the various specialists to behave as a team without conflicts and to allocate risk and reward correctly; (3) experience in various aspects of similar facilities; and timely, valuable optimization information from related parties in the planning and design phases.

In construction projects, Ashley (1986 cited in de Wit, 1988) identified seven success factors and six success criteria. These success factors are planning effort (construction), planning effort (design), project manager goal commitment, project team motivation, project manager technical capabilities, scope and work definition and control systems.

Ogunlana (2009) studied in critical success factors in large scale construction projects in Thailand. Their study emphasized that success factors vary across various projects. Their findings revealed project planning and control, project personnel and involvement of client

as critical factors influencing project success. Ann et al. (2006) in their study, investigated on CSFs in construction project briefing. Briefing process is prerequisite to achieving success in project performance. This process involves the interpretation of clients' actual views and requirements to project participants. Their study considered open and effective communication, clear and precise briefing documents, clear intention and objectives of client and clear project goal and objectives as critical success factors. Ugwu et al. (2007) identified nine top critical success factors that would act as enablers for successful implementation of ICT projects in construction as cost of development, top management support, availability of appropriate tools, development team knowledge and understanding of construction processes, ease applications, clear definition and understanding end user, clear communication, standardization issues and change management of organization level.

Marterella (2007) reviewed over 50 business processes and disclosed eight critical sales success factors influencing business performance as selection, performance management, skills assessment, defined solution offerings, demand creation, qualifying, proposal clarity and existing client expansion.

Jaselkis and Ashley (1988) identified the determinant factors in order to achieve budget, schedule and outstanding project performance. They identified 27 factors and grouped the success factors into four headings, which included project manager's capabilities, experience and authority, the stability of project team, project planning and control effort. After analyzing the information from 78 projects by logistic regression, they identified 'reducing team turnover' and 'program constructability', as the two key factors required for achieving project success on construction works.

Jaselkis and Ashley (1991) investigated the impact of the project team, planning and control efforts as they relate to achieving 'overall' project success, better-than expected schedule performance and better-than-expected budget performance. As in previous research, this research also used the discrete choice model as the analysis method. The results demonstrated that the key success factors affected the project outcomes differently. For example, 'increasing the number of budget updates' has better schedule and overall project performance. 'Implementation of a constructability program' seems to have a significant

impact on achieving overall project success and better schedule performance – especially on fixed-price contracts. 'Reducing team turnover' has more significant impact on improving budget performance than it does in achieving better schedule or overall project performance.

Chua et al. (1997) used another method to analyse the data derived from Jaselkis and Ashley (1988)'s research. They used neural networks as the analysing method focusing on budget performance only. The final model identified eight factors which were most important for budget performance. These eight factors included (1) number of organisational levels from the project manager to the craft workers, (2) amount of detailed design completed at the start of construction, (3) number of control meetings during the construction phase, (4) number of budget updates, (5) implementation of a constructability programs, (6) team turnover, (7) amount of money expended on controlling the project and (8) the project manager's technical experience.

Kog et al. (1999) replicated Chua et. al. (1997)'s research, but they aimed at identifying the key determinants for construction schedule performance. Like Chua et al., (1997)'s research, they also used the data derived by Jaselkis and Ashley in 1988. The key determinants included (1) time devoted by the project manager to a specific project, (2) frequency of meetings between the project manager and other project personnel, (3) monetary incentives provided to the designer, (4) implementation of constructability program and (5) project manager's experience on projects with a similar scope.

Chan and Kumaraswamy (1997) have determined and evaluated the factors causing delays for construction projects in Hong Kong. They have identified 83 hypothesized delay factors and grouped them into eight categories. The main reasons for delay were analyzed and ranked according to different groups classified on the basis of (a) role of the parties in the local construction industry (i.e. whether clients, consultants and contractors) and (b) the type of projects. They collected data from 167 local construction organizations and analyzed it by using the relative impact index method in order to rank the determinant delay factors for different types of construction projects. The results indicate that the five principal and common causes of delays are: poor site management and supervision, unforeseen ground

conditions, low speed of decision making involving all the project team, client initiated variations and necessary variations of works.

Distinguishing the characteristics of the success factors and the issues which influence the success factors for construction project have also been popular topic. Kothari (1986) and Chan (1992) identified the characteristics of the project manager in construction management. Kothari (1986) identified the characteristics of a successful project manager as: leadership, technical knowledge and experience, communication, planning and organisation, motivation and personality. Chan (1992) identified the additional characteristic of co-ordinating and controlling.

In Africa, Enshassi et al (2006) studied causes of contractor's business failure in developing countries. These were grouped together to only five main groups which are: managerial, financial, business growth, business environment and political factors. Managerial factors are mainly related to experience, decisions, procurement, control, productivity, communication and claims factors; financial factors are mainly related to loans, cash flow, profit, expenditures, material wastages, equipment cost and usage, and variation order; business growth factors are mainly related to managerial development, size of projects, type of work and number of projects; business environment factors are mainly related to regulations, awarding, economy, owner involvement and accounting practices and political factors are mainly related to delay, closure, lack of resource, high cost of materials, banks policy and dealing with suppliers. The results showed that political group is the most important influencing factor on contractor's business failure in Palestine. Otherwise, Business growth and Business environment had been ranked as the lowest influencing factors on failure.

Previous studies from Nigeria have revealed that soft factors have been applied in project delivery in Nigeria but poor project performance has also been recorded. This has resulted to low productivity growth which runs across all industrial sectors including Nigerian Construction Industry (Adenikinju and Ayonrinde, 2001). Malladi (2007) stipulated that enhancement of project performance will bridge productivity gaps.

Adenikinju (2005) graded productivity performance in Nigeria to be below average. His findings revealed technical inefficiency as a major influence to the decline. The result showed that technical efficiency declined by -1.29 percent per annum for the period of 1962-2000 while technical change declined by −1.01 percent annually over the same period.

Iyer and Tha (2006) found out through a survey in India that two most critical success factors are commitment of participants' and owners' competence. Executive support, user involvement, experienced project manager, clear business objectives, minimized scope, standard software infrastructure, firm basic requirements, formal methodology and reliable estimates were found out as the nine top success factors influencing project performance (Gartner group, 2004).

In Gaza strip, there are many construction projects fail in performance. There are many constructed projects fail in time performance, others fail in cost performance and others fail in other performance indicators. In 2006 there were many projects which finished with poor performance because of many evidential reasons such as: obstacles by client, non-availability of materials, roads closure, amendment of the design and drawing, additional works, waiting the decision, handing over, variation order, amendments in Bill of Quantity and delay of receiving drawings (UNRWA, 2006and2007).

Amaka (2011) studied the critical success factors influencing construction project performance in Nigeria. The research survey demonstrated the operating environment has a vital role in determining the critical success factors influencing project performance of a project. The result revealed six critical success factors which can influence project performance in Nigeria. These factors were objective management, management of design, technical factors, top management support and risk management.

Various attempts have been made by different researchers to determine critical success factors in construction (Beale and Freeman, 1991; Pinto and Slevin, 1987). The literature abounds with lists of variables supposedly influencing the quality of a building project. There are some variables common to more than one list, but there is certainly no general agreement on the variables. Review of this previous research reveals some common threads

of variables as affecting the quality of a building project. The generally perceived factors that influence quality performance can be grouped under the headings of business related factors, project procedures, project management actions and human-related factors.

2.3.1 Business Related Factors

Various researchers support ''environment'' as a factor affecting the project success (Walker and Vines 2000). Akinsola et. al. (1997) further described ''environment'' as all external influences on the construction process, including social, political, and technical systems. The attributes used to measure this factor are economic environment, social environment, political environment, physical environment, industrial relation environment, and level of technology advanced.

The comfort component grouping comprises adequate funding through the project, comprehensive contract documentation, availability of resources, continuing involvement of all stakeholders in the project, and competent project manager. This component emphasizes that successful projects are implemented in comfort. That is, money, resources, efforts and leadership should always be available throughout the project's life. They ensure that construction projects run smoothly. Money and other resources in terms of adequate funding until project completion and availability of resources are obvious imperatives to carry out projects. Availability of funds/resources has also been ranked highest in recent researches (Belassi and Tukel, 1996; White and Fortune, 2002).

Efforts, in terms of continuing involvements of all stakeholders and comprehensive contract documentation, are needed to ensure the existence of general agreements and collective genius of professionals in concerned organizations as well as proper project control. Similarly, one of the four CSFs in Sanvido et al. (1992) were a series of contracts that allows and encourages the various specialists to behave as a team without conflicts of interest and differing goals. These contracts must allocate risk and reward in the correct proportions. Also, it has been stated that project goals and deliverables cannot be achieved without the customer or end user involvement in the project (Dvir et al., 2003).

Leadership is also a crucial aspect in project management. Caudron (1999) noted three different kinds of competencies required in leadership: leadership competencies such as the ability to lead change, functional competencies such as technical and human resource management skills, and personal skills such as high achievement motivation and persistence. Zimmerer and Yasin (1998), in their research in USA, observed that the highest rated characteristics for effective project managers and for project success were team building, communicating, demonstrating trust, and focusing on results among others. Therefore, a competent project manager possesses not only technical and managerial skills but also good leadership to do the "right thing right" and search suitable tangible and intangible assets in today's knowledge-based economy.

2.3.2 Project Procedures

Quality performance has been considered as a function of the procedures adopted during the construction process (Serpell and Alarcon, 1998). Those procedures comprise the concept of procurement, form and the method of tendering. The fragmented nature of the construction industry, the fact that no two construction projects are identical and the resulting ephemeral nature of the project organisation places great dependence on the project team in setting up the building process and bringing the project to a successful conclusion (Davenport, 1995). To ensure success, the selection of the most appropriate organisation for the design and construction of the project requires early and particular attention.

In the main, the construction team will be appointed under competition through competitive tendering process. Sometimes, the head contractor may be appointed by negotiation on the basis of a fee. In cases where the design and construction is done as a complete package, both may be let by competition. The selection procedures applied to the members of the project team are therefore by no means always the same. It was noted from previous research that competitive tendering can adversely affect the outcome of major projects and the number of separate contracts is related to the chances of success. Different selection methods will pose different levels of risk to the project team members (Kumaraswamy and Dissanayaka, 1998; Chan, 1995). Systems such as competitive tendering would involve a

higher degree of risk to the team member, whereas cost reimbursement contracts would be low risk bearing by comparison.

Hersey and Blanchard (1982) have also identified the importance of clear goal definition to management success. Sidwell (1984) echoes this by advocating that clients who get the best results are those who provide the building team with well defined specialized needs and are able to become closely involved with the building process. All these suggest that a clear and well-defined goal will lead to a more successful outcome on project performance.

Project management action is a key for project success (Hubbard 1990). Jaselskis and Ashley (1991) suggested that by using the management tools, the project managers would be able to plan and execute their construction projects to maximize the project's chances of success. Then, the variables in project management include adequate communication, control mechanisms, feedback capabilities, troubleshooting, coordination effectiveness, decision making effectiveness, monitoring, project organization structure, plan and schedule followed, and related previous management experience (Chua et al. 1999; Walker and Vines 2000). A number of attributes will affect this factor, including the communication system, control mechanism, feedback capabilities, planning effort, organization structure, safety and quality assurance program, control of subcontractors' works, and finally the overall managerial actions.

Dierkmann and Girard (1995) identified the factors leading to contract disputes. This project identified the effect of different project characteristics, which included people, process and project aspects, on the occurrence of contract disputes. The findings of this work was based on logic regression analysis of data on the frequency and severity of disputes on 159 construction projects. The results concluded that all three issues played a role in influencing the likelihood of contract disputes, but the 'people' issue held the key to avoiding contract disputes.

Evaluation related to the construction parties and studying their influence on the project success is also another favourite topic. Kometa et al. (1995) researched on the pre-contract client evaluation process. They found that clients who conducted an internal audit of their

organizations before embarking on the briefing process, would generally have a higher level of success. Hatush and Skitmore (1997) researched into the pre-qualification for contractors. The aim of their research was to investigate the perceived relationship between 20 contractor selection criteria (CSC) currently in use and project success factors (PSFs) in terms of time, cost and quality involving a sample of eight experienced construction personnel.

A number of researchers identified the importance of procurement factors (Kumaraswamy and Chan 1999; Walker and Vines 2000). Dissanayaka and Kumaraswamy (1999) defined the scope of procurement as the framework within which construction is brought about, acquired or obtained. Therefore, two attributes are used to measure this factor; they are procurement method (selection of the organization for the design and construction of the project) and tendering method (procedures adopted for the selection of the project team and in particular the main contractor).

There has also been research which has identified the success factors that influence the performance of certain procurement strategies. Tiong et al. (1992) did the first research in this area. They identified the critical success factors in winning build operate-transfer (BOT) contracts. Cheng et al. (2000) identified the critical success factors for Project Finance Initiative (PFI) contracts and partnering projects respectively.

Construction materials can be purchased by two procedures, either purchasing directly, or purchasing for entire lump sum contract. However, purchasing materials before due time is very important in the construction, because the delay in purchasing will delay the completion date, and interrupt the schedule. Consequently, the contractor will be exposed to penalty which might sometimes cause contractor to fail (Phua and Rowlinson, 2004).

A change of procurement procedures is, however, impeded by clients' habitual behaviour (Laedre *et al.*, 2006). Although procurement procedures need to be tailored to enhance the fulfillment of different project objectives, clients tend to choose those procurement procedures they have a habit of using, regardless of any differences between projects. In order to enhance change, an increased understanding of how different procurement

procedures affect different aspects of project performance is vital. Earlier research efforts in this area have been limited to the investigation of how a single or a few specific procurement alternatives affect one or two project objectives. In order to achieve successful governance of construction projects a holistic and systemic approach to procurement procedures is crucial (Eriksson, 2008).

2.3.3 Project Management Factors

Project management is the integral of the entire construction project functions which include coordination of subcontractors, scheduling, cost control, labor relation, billing, purchasing, expending, and other functions related to the project. In Construction Company, project manager is in charge of these functions. The use of project management techniques is very important in the construction industry, because the coordination and use of the many types of labor, skills, materials, and equipments which are used in construction, require daily application of proper project management techniques (Phua and Rowlinson, 2004).

The managerial system is primarily concerned with decision making for planning and controlling organizational endeavour. The managerial subsystem can be seen as spanning the entire organisation by relating the organisation to the environment, setting the goals, developing comprehensive strategic, and operational plans, designing the structure and establishing control processes (Kast and Rosenzweig, 1985). An integral element of the managerial task is organizational decision making – choosing an overall strategy, setting specific objectives, designing structures and processes, selecting people, delegating responsibility, evaluating results and initiating changes.

Sidwell (1982) advocated that the degree of project management actions can be reflected in the range and type of control mechanisms set up for the particular problem. At one end of the range will be a very low control situation, where neither professional design team, drawings, specifications, documentation nor standard form of contract exist. Minor works may fall into this category. On the other hand a high control situation may exist if detailed documentation is administered through a system of regular meeting, monitoring and inspections.

Sidwell (1982) concluded that managerial control (classed as project management actions) is a key element in achieving project success, being significantly related to all measures of success. Ireland (1983) found similar results for managerial action. Rowlinson (1988) concluded that high level of administrative ability in the project team leads to reduced time overruns, which in turn leads to increased satisfaction.

Increased complexity, uncertainty, and time pressure in construction projects have increased the need for cooperation among different project actors (Anvuur and Kumaraswamy, 2007). Traditionally, relationships are, however, very competitive and adversarial in the construction industry, which to a large extent is due to the customary procurement procedures potentially causing many problems in all stages of the buying process. Therefore, in order to take advantage of collaboration, procurement procedures are one key improvement area and can contribute substantially to project success (Eriksson, 2007).

Intensive communication is a central factor in leading and integrating people and taking decisions to create a successful project (Laufer et al., 1996). Thus, there is need to establish an effective information system for construction projects so that every right and concerned person can access and share ideas. More broadly speaking, "shared project vision" is impossible when there is poor communication among project stakeholders. As people become better informed and more aware of what is happening in their project, they will become more involved and committed to project's progress, and as a consequence, become better motivated (Clarke, 1999). Regardless of research scope and context, cooperation is consistently ascribed to be a vital determinant of construction project success (Phua and Rowlinson, 2004).

Frequent progress meetings are, therefore, inevitable. "What is going on" is communicated to the parties. Then, corrective and preventive actions are timely applied to ensure good project performance. Proper project monitoring and control system is impossible without effective progress meetings. A project has a chance to be completed successfully when the project plans are updated regularly. Moreover, in order to ensure project success, the plans need to be kept simple, with the right level of detail that can encourage a project to be reviewed readily (Clarke, 1999).

Community involvement is another factor in the communication component. It has been found to be an important factor in previous studies (Awakul and Ogunlana, 2002). Large-scale construction projects are usually fraught with controversy. Therefore, a supportive and understanding community is necessary for smooth implementation. This cannot be achieved unless the project information is shared adequately. Yeo (1995) noted that a large infrastructure project needs support and understanding from the community affected by the project, especially during the construction period. He added that managing public reactions and opinions and understanding public attitudes are an integral part of the project management's responsibility. It is then essential that the project participants should truthfully share the project information and obtain different public perspectives regarding their project.

2.3.4 Human-Related Factors

Chua et al. (1999) defined project participants as the key players, including project manager, client, contractor, consultants, subcontractor, supplier, and manufacturers. Walker (1995) considered influence of client and client's representative as a significant factor on construction time performance. The client-related factors concerned with client characteristics, client type and experience, knowledge of construction project organization, project financing, client confidence in the construction team, owner's construction sophistication, well-defined scope, owner's risk aversion, client project management (Dissanayaka and Kumaraswamy 1999).

Designers play a vital role as their work involves from inception to completion on a project. Chan and Kumaraswamy (1997) considered that design team-related factors consist of design team experience, project design complexity, and mistakes/delays in producing design documents. The main contractor and subcontractors start their main duties when the project reaches the construction stage. The variables include contractor experience, site management, supervision and involvement of subcontracting, contractor's cash flow, effectiveness of cost control system, and speed of information flow (Dissanayaka and Kumaraswamy 1999).

The project manager is another key stakeholder in a construction project and his competence is a critical factor affecting project planning, scheduling, and communication (Belassi and Tukel 1996). Variables under this factor consist of the skills and characteristics of project managers, their commitment, competence, experience, and authority (Chua et al. 1999). A construction project requires team spirit, therefore team building is important among different parties. Team effort by all parties to a contract—owner, architect, construction manager, contractor, and subcontractors—is a crucial ingredient for the successful completion of a project (Hassan 1995).

Competence is another prerequisite for the success of construction projects. The component includes utilization of up-to-date technology, proper emphasis on past experience, multidisciplinary/competent project team, and awarding bids to the right designer/contractor. Large construction projects need certain kinds of technology, but selecting the right technology may be problematic, especially when the project team is incompetent. Technology transfer has often been the focus of discussions, yet developing countries still use obsolete technology (Eriksson, 2008). Possession of modern technology is a critical factor for success and sustenance in today's business environment.

A serious challenge to construction industries in developing countries is their inability to adopt or adapt established best practices already working in other countries (Ngowi, 2002). Additionally, although public-sector clients in developing countries and some donor agencies support construction technology transfer, it faces several problems. It is therefore, obvious that the right technology needs the right people to select, manage and utilize it.

Proper emphasis on past experience and multidisciplinary/competent project team are success factors proposed in many textbooks and research works (Loo, 2002). Project teams themselves, not project managers, deliver projects and shape the implementation of the project. A team consisting of all necessary specialists, professionals and experts is able to make integrative decisions based on seeing the picture as a whole, and executes them later on with greater pace. Proper project planning and control require project teams to utilize appropriate project management techniques and tools.

On large construction projects in developing countries, it is extremely difficult to assemble adequate and capable professionals to direct projects to success. Thus, it is not surprising that these factors are perceived as having high impact on project success. The involvement of many parties is a dominant characteristic of construction projects (Eriksson, 2008). If one of the parties is not capable to act within his/her role, the project is likely to fail. It is, therefore, essential to ensure that the bidding process can help single out the right designers, contractors and other parties to effectively transform project ideas into reality.

A recent study (Long, 2003) conducted in Vietnam found that problems responsible by designers/consultants and contractors had very high frequency and influence on large construction projects. It can be concluded that these participants play vital roles in running projects and directing them to success or failure. Commitment to project and top management support are the other issues related to the commitment component grouping. It has been recognized as one of the most critical factors for the successful completion of projects in numerous studies (White and Fortune, 2002; Sanchez and Perez, 2002).

The responsibility of top management toward the project is important and its commitment and support is a crucial requirement for project success (Munns and Bjeirmi, 1996). It is noted that top management should be understood to mean top management of all concerned project parties. Top management support demonstrates visibly how strong the commitment to the project is. For example, project members usually do not see project management as something to help them but rather something which is mandatory, serving little useful purpose. As such, motivation is prerequisite to ensure comfortable working environment within and around project sites. This does not axiomatically exist without commitment from the top management of all project parties.

2.4 Conceptual Framework

The various variables affecting the factors are identified in the previous section. Variables within each group are interrelated. A variable in one group can influence a variable in the others, and vice versa. To study how these factors affect project success separately and collectively, it is hypothesized that "Project success is a function of Business -related

factors, project procedures, project management actions and human-related factors and they are interrelated.

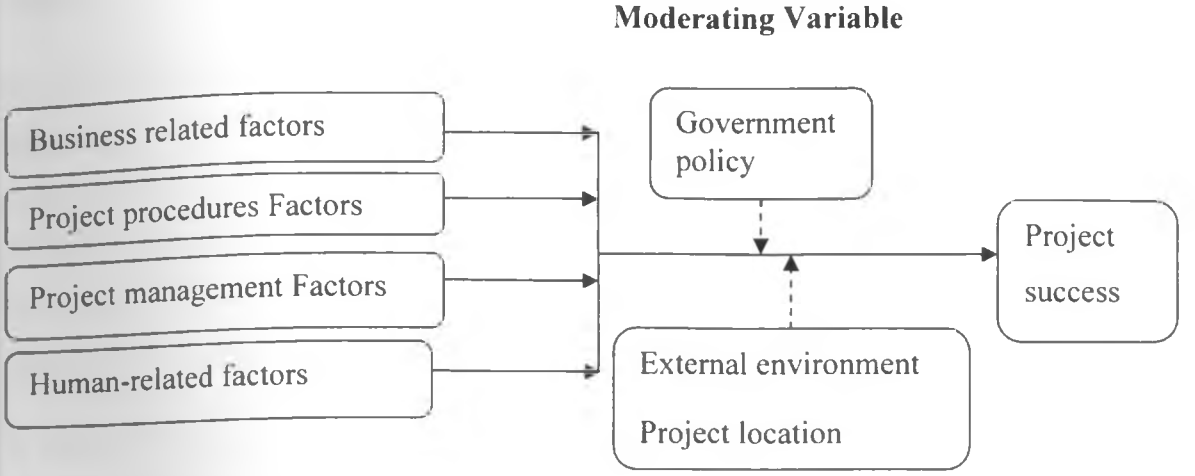

Figure 1: Conceptual Framework

For a project to succeed, business related factors such as money, resources, leadership efforts and leadership should always be available throughout the project's life. In addition, project procedures comprising of procurement, method of tendering, selection of the most appropriate organization for the design and construction of the project requires early and particular attention. Also important are various project management actions which include coordination of subcontractors, scheduling, cost control, labor relation, billing, purchasing, expending, and other functions related to the project should be streamlined to ensure the project stick to the plan. Finally, human-related factors which touch on the project participants including project manager, client, contractor, consultants, subcontractor, supplier, and manufacturers are also important in project success.

2.5 Research Gap

General contractors for construction projects have found that the projects are becoming bigger and bigger, while construction tasks have become more complicated and diversified. The construction industry is dynamic in nature due to the increasing uncertainties in

technology, budgets, and development processes. Nowadays, construction projects are becoming much more complex and difficult. The project team is facing unprecedented changes.

In a new competitive environment, growing construction enterprises need not only to pay attention to changes in their external product market, but also to form their unique core competitiveness through integration of internal resources and accumulating knowledge and abilities. This is the only way for them to remain in a successful position in the industry and turn their core competitiveness into excellent project management. Factors of various aspects affect construction contractors' competitiveness.

In many countries, the construction industry frequently receives criticism regarding poor quality and customer satisfaction, frequent conflicts and disputes among different actors, and cost and schedule overruns in projects. Construction projects are mostly characterized by high complexity, customization and uncertainty coupled with long duration. Such characteristics require collaboration and coordination among many different actors. This study therefore looked at the key factors that influence success in large construction projects with reference to KURA projects.

2.6 Summary of Chapter Two

This chapter reviews the relevant literature in relation to the research questions presented in the study. The chapter demonstrated that a construction project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter was a blueprint of the methodology that was used by the researcher to conduct the study. In this chapter the research methodology was presented in the following order, research design, population and sampling, data collection methods, instruments of data collection, data analysis and finally operationalization of variables.

3.2 Research Design

This research adopted a descriptive survey methodology to uncover the key factors for project success during implementation/construction stage. The method was chosen since it is more precise and accurate since it involves description of events in a carefully planned way (Babbie, 2004). This research design also portrays the characteristics of a population fully (Chandran, 2004). This design is appropriate since the study sought to describe the key factors in a construction project, estimate their keyness based on the responses from the Project management team and make predictions. The design was also able to produce statistical information about aspects of the subject that interest policy makers and researchers.

3.3 Target Population

The target projects in this study consisted of all KURA construction projects with total budget greater than One million US dollars ($ 1 Million), which were assumed to be large projects in this research, undertaken from the year 2008 to 2012. These were forty (40) in number by June 2012 as per the information provided by the KURA. Therefore, the target population of the study was 125 senior managers of the construction companies, client representatives and the consultants.

3.4 Sampling

Mugenda and Mugenda (2003) defines sampling as the process of selecting a number of individuals for a study in such a way that the individual selected is representative of the larger group from which they are selected. Kish (1965) showed that the sample size can be calculated as following equation for 94% confidence level (Assaf et al 2001, Israel 2003, Moore et al, 2003):

$$n = n'/ [1+(n'/N)]$$

Where:

N = total number of population

n= sample size from finite population

n' = sample size from infinite population

$= S^2/V^2$; where S is the variance of the population elements and V is a standard error of sampling population = 384

So, for 125 project personnel:

$$n = n'/ [1+(n'/N)]$$

$$n = 384/ [1+ (384/125)]$$

Approx = 94

A total of 94 senior managers of the contracting firms, client representatives and the consultants were targeted where they would give their feedback on key success factors for large construction projects. The sampling method employed here was purposive sampling where the research is confined to specific target sample space meaning known correspondent provides information. According to Oso and Onen (2005), purposive sampling starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. Saunders and Thornhill (2003) also

posited that purposeful sampling is useful when one want to access a particular subset of people and thus the study used it to select only the senior managers in the large construction companies since they were the ones conversant with the subject matter of the study.

3.5 Data Collection Methods

This study was carried out using structured questionnaire. Sekaran (2003) indicated that questionnaire is a popular method of collecting data because researchers can gather information fairly easily and the questionnaire responses are easily coded. The questionnaire was attached as Appendix II. The data was collected using personal interviews (face to face), and 'drop and pick later' method. The target respondents were ninety four (94) senior officials of the targeted firms, with good education, adequate knowledge in Project management, and over ten years' experience in the construction industry. Secondary data was also collected through contract documents and progress reports for the projects.

3.6 Validity

This section presents test of validity of questionnaire according to the pilot study. Validity refers to the degree to which an instrument measures what it is supposed to measure (Pilot and Hungler, 1985). Validity has a number of different aspects and assessment approaches. Statistical validity is used to evaluate instrument validity, which include criterion-related validity and construct validity.

To ensure the validity of the questionnaire, two statistical tests were applied. The first test was Criterion-related validity test (Spearman test) which measures the correlation coefficient between each paragraph in one field and the whole field. The second test was structure validity test (Spearman test) that was used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one filed and all the fields of the questionnaire that have the same level of similar scale.

The designed questionnaire was randomly distributed to three principal construction parties (Client, PM Consultant and Contractor), and two University Lecturers each from the fields of Building Construction and Project management. The pilot survey data was then analyzed and the results used for comprehensiveness and suitability for full study.

3.7 Reliability

This section presents test of reliability of questionnaire according to the pilot study. The reliability of an instrument is the degree of consistency which measures the attribute it is supposed to be measuring (Polit and Hunger, 1985). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool. The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient (Polit and Hunger, 1985).

The designed questionnaire was randomly distributed to three principal construction parties (Client, PM Consultant and Contractor), and two University Lecturers each from the fields of Road Construction and Project management. The pilot survey data was then analyzed and the results used for comprehensiveness and suitability for full study.

Cronbach's coefficient alpha (George and Mallery, 2003) is designed as a measure of internal consistency, that is, do all items within the instrument measure the same thing? Cronbach's alpha was used here to measure the reliability of the questionnaire between each field. The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0. The closer the Alpha is to 1, the greater the internal consistency of items in the instrument being assumed.

3.8 Data Analysis

After collecting data responses from the questionnaire, the researcher analyzed the quantitative data using descriptive statistics by applying the Statistical Package for Social Science (SPSS V.19.0) and presented through percentages, means, standard deviations and

frequencies. The use of structured questionnaires enabled the researcher to quantify quantitative data using the size, frequency distribution, and association of variables in the study population and answers to questions that could be counted and expressed numerically. The information was displayed by use of tables, graphs and in prose-form. In addition, factor analysis was used to select the most important factors while Spearman's rank correlation was used to calculate the average ranking of the factors.

Then, to identify the Key Factor Index (KFI), for each factor, the factors' keyness was defined as in Table 3.1 below;

Table 3.1: Key Factor Assessment Criteria

Mean Factor Score Range	KFI	Success Level
1.0 – 2.5	1	Least Significant
>2.5 – 5.0	2	Mildly Significant
>5.0 – 7.5	3	Moderately Significant
>7.5 – 10.0	4	Most Significant

Spearman's coefficient of rank correlation is used to demonstrate whether there is the agreement or disagreement among each pair of parties while Factor analysis is a systematic, statistical procedure used to uncover relationships amongst several variables. This procedure enables numerous correlated variables to be condensed into fewer dimensions known as factors. The purpose of factor analysis is to discover simple patterns in the pattern of relationships among variables. In its procedure, rotation is applied to identify meaningful factor names or descriptions.

3.9 Operational Definition of Variables

The operationalization of variables was as shown in Table 3.2

Table 3.2: Operationalization of Variables

Objectives	Type of Variable	Indicator	Measuring of Indicators	Scale	Tools of analysis	Type of analysis
To identify business-related factors that influence success of KURA construction projects	Independent	Business-related factors	Adequacy of funding Technology availability Human Skill availability X-Factor (fraudulent practices, corruption, favoritism, lack of ethics, etc.) Commitment of all parties to the project	Nominal ordinal	Frequency distribution tables and percentages	Descriptive Content analysis Factor analysis Spearman's rank correlation
To establish the project procedures that influence success of KURA construction projects	Independent	Project procedures	Project delivery system Project bidding method Project contract mechanism Control mechanism Feedback capabilities Troubleshooting Quality assurance program Safety program	Nominal ordinal	Frequency distribution tables and percentages	Descriptive Factor analysis Spearman's rank correlation
To establish the project management actions that influence success of	Independent	Project management factors	Communication systems Upfront planning efforts Monitoring and updating plans	Nominal ordinal	Frequency distribution tables and percentages	Descriptive Content analysis Factor analysis

KURA construction projects			Developing an appropriate structure Control of subcontractor work Implementing safety program Implementing QA programs Coordination effectiveness Decision making effectiveness Project monitoring Risk identification and allocation			Spearman's rank correlation
To identify human-related factors that influence success of KURA construction projects	Independent	Human-related factors	Client-related Design team-related Contractor-related Project Manager-related	Nominal ordinal	Frequency distribution tables and percentages	Descriptive Factor analysis Spearman's rank correlation
Dependent variable	Dependent	Project success	Cost Time Quality Productivity Client Satisfaction Regular and community satisfaction People Health and Safety Innovation and learning Environment	Nominal ordinal	Frequency distribution tables and percentages	Descriptive Factor analysis Spearman's rank correlation

3.10 Summary of Chapter Three

Chapter three described the nature of the study as descriptive survey in order to enable the researcher to learn more about the key factors in a construction project estimate their keyness based on the responses from the Project management team and make predictions. Whilst the study does not seek to make any broad generalizations to the population, the selected interviewees were identified. Data collection method was through questionnaires and secondary data sources. A pilot study was conducted and the data was analyzed using descriptive statistics and presented on tables.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter focused on data analysis, interpretation and presentation. The purpose of the study was to investigate the factors that influence success in large construction projects where the focus was on the Kenya Urban Roads Authority projects. As such the study sought to establish how business -related factors, project procedures, project management factors and human-related factors influence success in large construction projects undertaken by Kenya Urban Roads Authority. The data was gathered from questionnaires as the research instrument and secondary data was utilized to supplement the primary data obtained. The questionnaire was designed in line with the objectives of the study. The study employs various statistical tools for extracting the factors that influence success in large construction projects in the Kenya Urban Roads Authority.

4.1.1 Response rate

This research study had a sample size of ninety four (94) senior officials of the targeted firms, as well as, client representatives and the consultants with good education, adequate knowledge in Project management, and over ten years' experience in the construction industry. Out of this sample size 79 questionnaires were filled and returned to the researcher which represents a sample size of 84.04% response rate. This response rate was excellent and conforms to Mugenda and Mugenda (1999) stipulation that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. This commendable response rate can be attributed to the data collection procedure, where the researcher personally administered questionnaires and waited for respondents to fill in, kept reminding the respondents to fill in the questionnaires through frequent phone calls and picked the questionnaires once fully filled.

4.2 Institution Details and Demographic Characteristics

The demographic characteristics of the respondents were investigated in the first section of the questionnaire. They are presented in this section under designations, level of education, experience in construction management, project stakeholder position, years involved in construction and nature of the other projects handled.

Table 4.1: Key Factor Assessment Criteria

	Frequency	Percent
Managerial staff	9	11.4
Assistant management staffs	13	16.5
General staffs	25	31.6
Consultants	17	21.5
Contractors	15	19
Total	79	100

From the findings as shown in Table 4.1, majority (31.6%) of the respondents indicated that they were general staffs in the Kenya Urban Roads Authority, 21.5% of the respondents were consultants, 19% of the respondents comprised of contractors, 16.5% of the respondents were assistant heads of departments staffs, while 11.4% of them represented the heads of departments staffs.

Table 4.2: Level of Education

Level of Education	Frequency	Percent
O Level	0	0
Certificate	6	7.6
Diploma	16	20.3
Undergraduate degree	37	46.8
Masters and above	20	25.3
Total	79	100

The study results in Table 4.2 reveal that 46.8% of the respondents had acquired a Bachelor's or undergraduate degrees level of education, 25.3% of them indicated that they had acquired post graduate degree as their highest level of education, 20.3% of the respondents indicated that they had acquired college diplomas, while 7.6% of the respondents reiterated that they had acquired college certificates. These findings further

imply that all the respondents were academically qualified and also familiar with their duties and could dispense them effectively in terms of professional work ability and performance.

The length of service/working in an organization determines the extent to which one is aware of the issues sought by the study. On the years of experience in construction management, majority of the respondents reiterated that they had an experience of more than 10 years. It was clear that the lowest serving staff had an experience of 5 years and the highly experienced respondent was 17 years in the construction management. These results imply that the respondents were conversant with the factors that influence success in large construction projects in the Kenya Urban Roads Authority.

The study targeted senior officials of the targeted firms, as well as, client representatives and the consultants. As such the study sought to establish the project stakeholder positions of the respondents.

Table 4.3: Project Stakeholder Position

Stakeholder Positions	Frequency	Percent
Client/owner	47	59.5
Contractor	15	19
Consultant	17	21.5
Total	79	100

According to Table 4.3, 19% of the respondents were project contractors, 59.5% of them reiterated that they were clients or owners of the projects, while 21.5% of them were project consultants.

Table 4.4: Years Involved in Construction

Length in years	Frequency	Percent
0-5 Years	4	5.1
5-10 Years	19	24
10-15 Years	7	8.9
Over 15 Years	49	62
Total	79	100

Table 4.4 shows the results on the number of years that the respondents had been involved in construction. Accordingly, 62% of the respondents indicated that they had an experience

of over 15 years in construction, 24% of them had worked in the construction industry for a period of 5-10 years, 8.9% of the respondents indicated that they had an experience of between 10-15 years, while 5.1% of them had a working experience of over 5 years in the construction industry. This shows that majority respondents had enough work experience in the construction industry to respond effectively.

Table 4.5: Nature of the other Projects Handled

Sector	Frequency	Percent
Public	41	52
Private	38	48
Total	79	100

From the study results in Table 4.5, 52% of the respondents handled projects in the public sector, as compared to 48% of those who indicated that they mainly dealt with projects in the private sector.

4.3 Key Success Factors in Construction Projects

The study sought to establish the effects of various factors in influencing the success or failure of a project. These factors included business -related factors, project procedures, project management factors and human-related factors. As such the study provided various factors which may be key to the success or failure of a project and required the respondents to rate the factors on a sale of 1 to 10 where 1 was the lowest rank (not significant), 2 was least significant, 3 was less significant, 4 was just significant, 5 was moderately significant, 6 was quite significant, 7 was highly significant, 8 was much significant, 9 very significant and 10 was the highest rank (extremely significant) based on the projects tackled so far.

4.4 Business Related Factors

The study was interested in investigating the influence of various business related factors on the success of a project within the construction industry.

Table 4.6: Rating of Business Related Factors

Business Related Factors	Mean	Std. Deviation
Commitment of all parties to the project	4.6286	0.54298
Adequacy of funding	7.3800	1.218
Technology availability	8.2000	1.083
Human Skill availability	8.3800	0.992
X-Factor (fraudulent practices, corruption, favoritism, lack of ethics, etc.)	5.4600	1.045
Economic environment	7.9142	0.52297
Social environment	7.9142	0.43191
Political environment	8.1714	0.37078
Physical work environment	6.7428	0.83703
Industrial relations environment	8.1604	0.76274
Administrative approvals environment	4.1714	0.56393

According to the results in Table 4.6, majority of the respondents rated human skill availability as being much significant as shown by a mean score of 8.3800, as well as technology availability shown by a mean score of 8.2000, political environment shown by a mean score of 8.1714, industrial relations environment as shown by a mean score of 8.1604, economic environment as shown by a mean score of 7.9142 and social environment as shown by a mean score of 7.9142. They further rated the adequacy of funding to be highly significant as shown by a mean score of 7.3800, physical work environment was also rated to be highly significant as shown by a mean score of 6.7428 and X-Factor (fraudulent practices, corruption, favoritism, lack of ethics, etc.) to be moderately significant as shown by a mean score of 5.4600 as well as commitment of all parties to the project shown by a mean score of 4.6286, while they rated administrative approvals environment as just significant as shown by a mean score of 4.1714.

4.5 Project Procedures Factors

The study further sought to establish the extent to which various project procedure factors influence the success of a project within the construction industry. These results are depicted in Table 4.7.

Table 4.7: Rating of Project Procedures

Project procedures	Mean	Std. Deviation
Project delivery system (e.g. design-bid-build, design build)	7.3750	1.2500
Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding)	7.0978	1.1772
Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.)	4.7679	0.46675
Control mechanism	7.5488	1.1323
Feedback capabilities	4.5893	0.62601
Troubleshooting	7.0000	0.5898
Quality assurance program	6.5000	0.6757
Safety program	5.1000	1.163

From the study, majority of the respondents reiterated that control mechanism is highly significant as shown by a mean score of 7.5488; project delivery system (e.g. design-bid-build, design build) was also rated to be highly significant as shown by a mean score of 7.3750 as well as project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding) shown by a mean score of 7.0978, troubleshooting shown by a mean score of 7.0000 and quality assurance program shown by a mean score of 6.5000, while they rated safety program to be moderately significant as shown by a mean score of 5.1000, project contract mechanism (e.g. lump sum, unit price, cost plus, etc.) to be moderately significant as shown by a mean score of 4.7679 and feedback capabilities to be moderately significant as shown by a mean score of 4.5893.

4.6 Project Management Factors

Project management factors also affect the success of a project within the construction industry. This section therefore is dedicated to investigating the significance of various

aspects of project management factors on the success of a project within the construction industry.

Table 4.8: Respondents Rating on Project Management Factors

Project Management Factors	Mean	Std. Deviation
Communication systems	7.9398	1.3081
Upfront planning efforts	8.3158	0.9280
Monitoring and updating plans	4.4962	0.7030
Developing an appropriate structure	8.3008	1.2762
Control of subcontractor work	7.9098	1.1339
Implementing safety program	6.7500	1.2041
Implementing QA programs	7.3750	1.3524
Coordination effectiveness	7.5834	0.5882
Decision making effectiveness	7.1666	0.7755
Clear objectives and scope	6.9166	0.8836
Holding of regular meetings	7.3750	1.2500
Developing standard procedures/absence of bureaucracy	7.0978	1.1772
Prior project management experience	6.5000	0.6756
Risk identification and allocation	7.5488	1.1322
Formal dispute resolution process	5.6600	0.7012
Commitment to project	4.9600	0.8312
Top management support	6.5000	0.6756
Effective Strategic Planning	6.2500	0.6796
Adequate funding throughout the Project	4.9836	1.0742
Comprehensive Contract documentation	7.3750	1.2500
Up to date technology utilization	7.0978	1.1772

From the study, majority of the respondents rated upfront planning efforts to be highly significant as shown by a mean score of 8.3158 as well as developing an appropriate structure shown by a mean score of 8.3008, communication systems shown by a mean score of 7.9398, control of subcontractor work shown by a mean score of 7.9098, coordination effectiveness shown by a mean score of 7.5834 and risk identification and allocation shown by a mean score of 7.5488. They further indicated that implementing QA programs is highly significant in the success of construction projects as shown by a mean score of 7.3750, holding of regular meetings is highly significant in the success of construction projects as shown by a mean score of 7.3750, comprehensive contract documentation is highly

significant as shown by a mean score of 7.3750, decision making effectiveness is highly significant as shown by a mean score of 7.1666, developing standard procedures/absence of bureaucracy is highly significant as shown by a mean score of 7.0978, up to date technology utilization is highly significant as shown by a mean score of 7.0978, clear objectives and scope is highly significant as shown by a mean score of 6.9166, implementing safety program is highly significant as shown by a mean score of 6.7500 as well as prior project management experience and top management support shown by a mean score of 6.5000 in each case. Accordingly they rated effective strategic planning to be quite significant as shown by a mean score of 6.2500 as well as formal dispute resolution process as shown by a mean score of 5.6600, while they adequate funding throughout the project and commitment to project were rated to be moderately significant as shown by mean scores of 4.9836 and 4.9600 respectively and that monitoring and updating plans is just significant in the success of a projects as shown by mean scores of 4.4962.

4.7 Human-Related Factors

In its fourth specific objective, the study sought to identify human-related factors that influence success of KURA construction projects. As such the various characteristics of human-related factors are investigated in the following sub-sections which include client-related factors, design team-related factors, contractor-related factors and project manager-related factors.

4.7.1 Client-related Factors

Table 4.9: Rating the Significance of Client-Related Factors

Client-related Factors	Mean	Std. Deviation
Client's experience	6.9260	0.89815
Nature of client (Funding and organizational structure)	8.8642	0.81303
Client's knowledge of construction project organization	4.9444	1.04207
Client's confidence in construction team	7.6976	1.11504
Owner's construction sophistication	8.1234	1.36153
Client's project management	7.9876	1.16447
Client's ability to make decision	7.6358	1.09071
Client's ability to define roles	4.6636	1.20156
Awarding bids to the right designer/contractor	6.4012	0.86551

According to the results in Table 4.9, nature of client (privately funded vs. publicly funded) was rated to be very significant in determining the success of a projects as shown by mean scores of 8.8642; owner's construction sophistication was found to be highly significant as shown by a mean score of 8.1234. Further, client's project management is highly significant as shown by a mean score of 7.9876 as well as client's confidence in construction team shown by a mean score of 7.6976 and client's ability to make decision highly significant as shown by a mean score of 7.6358. The respondents rated client's experience to be highly significant in the success of construction projects as shown by a mean score of 6.9260; awarding bids to the right designer/contractor was rated to be quite significant as shown by a mean score of 6.4012, while client's knowledge of construction project organization and client's ability to define roles were rated to be moderately significant in the success of construction projects as shown by mean scores of 4.9444 and 4.6636 respectively.

4.7.2 Design Team-Related Factors

Table 4.10: Rating of Design Team-Related Factors

Design team-related Factors	Mean	Std. Deviation
Design team experience	4.7428	0.76464
Project design complexity	7.5428	0.70549
Adequacy of plans and specifications	8.5142	1.03119
Accurate initial cost estimates	6.7428	0.98056

From the results depicted in Table 4.10, majority of the respondents rated adequacy of plans and specifications to be very significant as shown by a mean score of 8.5142. They further rated project design complexity to be very significant as shown by a mean score of 7.5428, accurate initial cost estimates to be just significant as shown by a mean score of 6.7428 and design team experience to be moderately significant as shown by a mean score of 4.7428.

4.7.3 Contractor-Related Factors

Table 4.11: Rating of Contractor-Related Factors

Contractor-related factors	Mean	Std. Deviation
Contractor experience	7.9142	0.52297
Site management	7.9142	0.43191
Contractor's cash flow	8.1714	0.37078
Effectiveness of cost control system	6.7428	0.83703
Speed of information flow	5.1000	1.163

As shown in Table 4.11, according to the majority of the respondents, contractor's cash flow was rated to be very significant as shown by a mean score of 8.1714 as well as contractor experience and site management shown by a mean score of 7.9142 in each case; The contractors effectiveness of cost control system was indicated to be just significant as shown by a mean score of 6.7428, while speed of information flow was rated to be moderately significant as shown by a mean score of 5.1000.

4.7.4 Project Manager-related Factors

Table 4.12: Rating of Project Management Factors on Project Success

Project Manager-related Factors	Mean	Std. Deviation
Project Manager's competence	6.3278	1.12813
Project Manager's experience	6.8196	1.24334
Project Manager's authority to take day-to-day decisions	4.5957	0.55651
Project Manager's authority to take financial decision, selecting key team members, etc.	4.6286	0.54298
Technical capability of project manager	6.6072	1.11060
Leadership skills of project manager	6.2858	1.10254
Organizing skills of project manager	6.6072	1.18965
Coordinating ability and rapport of project manager with contractors/ subcontractors	4.4262	1.11228
Coordinating ability and rapport of project manager with owner/ owner representatives	4.6886	1.27652
Motivating skills of project manager	5.1476	0.93913
Project manager's commitment to meet quality, cost and time	6.7214	1.23872
Project manager's early and continued involvement in project	5.2460	1.09794
Project manager's adaptability to changes in project plan	7.0820	1.16295
Construction control meetings	6.3934	1.19471
Continuing involvement of stakeholders in the project	4.7428	0.76464

On project manager-related factors, Table 4.12 shows that the respondents rated project manager's adaptability to changes in project plan to be significant as shown by a mean score of 7.0820, project manager s experience, project manager's commitment to meet quality, cost and time, technical capability of project manager and organizing skills of project

manager were also found to be significant as shown by mean scores of 6.8196, 6.7214, 6.6072 and 6.6072 respectively. The respondents further rated construction control meetings, project manager's competence and leadership skills of project manager to be quite significant as shown by mean scores of 6.3934, 6.3278 and 6.2858 respectively, while they rated project manager's early and continued involvement in project, motivating skills of project manager, continuing involvement of stakeholders in the project, coordinating ability and rapport of project manager with owner/ owner representatives, project manager's authority to take financial decision, selecting key team members, etc., and project manager's authority to take day-to-day decisions moderately significant as shown by mean scores of 5.2460, 5.1476, 4.7428, 4.6886, 4.6286 and 4.5957 respectively and coordinating ability and rapport of project manager with contractors/ subcontractors was rated to be just significant as shown by a mean score of 4.4262.

4.8 Spearman's Coefficient Key Factor Assessment Criteria

To identify the Key Factor Index (KFI), for each factor, the factors' keyness was defined using the Spearman's coefficient of rank correlation. The results are as shown in Table 4.13.

Table 4.13: Spearman's Ranking of Factors Influencing Project Success

Factors Influencing Project Success	Mean	Success Level	KFI
Commitment of all parties to the project	4.6286	Mildly Significant	2
Adequacy of funding	7.3800	Moderately Significant	3
Technology availability	8.2000	Most Significant	4
Human Skill availability	8.3800	Most Significant	4
X-Factor (fraudulent practices, corruption, favoritism, lack of ethics, etc.)	5.4600	Moderately Significant	3
Economic environment	7.9142	Most Significant	4
Social environment	7.9142	Most Significant	4
Political environment	8.1714	Most Significant	4
Physical work environment	6.7428	Moderately Significant	3
Industrial relations environment	8.1604	Most Significant	4
Administrative approvals environment	4.1714	Mildly Significant	2
Project delivery system (e.g. design-bid-build, design build)	7.3750	Moderately Significant	3
Project bidding method (e.g. price based competitive bidding, negotiated bidding, best	7.0978	Moderately Significant	3

value bidding)			
Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.)	4.7679	Mildly Significant	2
Control mechanism	7.5488	Most Significant	4
Feedback capabilities	4.5893	Mildly Significant	2
Troubleshooting	7.0000	Moderately Significant	3
Quality assurance program	6.5000	Moderately Significant	3
Safety program	5.1000	Moderately Significant	3
Communication systems	7.9398	Most Significant	4
Upfront planning efforts	8.3158	Most Significant	4
Monitoring and updating plans	4.4962	Moderately Significant	3
Developing an appropriate structure	8.3008	Most Significant	4
Control of subcontractor work	7.9098	Most Significant	4
Implementing safety program	6.7500	Moderately Significant	3
Implementing QA programs	7.3750	Moderately Significant	3
Coordination effectiveness	7.5834	Most Significant	4
Decision making effectiveness	7.1666	Moderately Significant	3
Clear objectives and scope	6.9166	Moderately Significant	3
Holding of regular meetings	7.3750	Moderately Significant	
Developing standard procedures/absence of bureaucracy	7.0978	Moderately Significant	3
Prior project management experience	6.5000	Moderately Significant	3
Risk identification and allocation	7.5488	Most Significant	4
Formal dispute resolution process	5.6600	Moderately Significant	3
Commitment to project	4.9600	Mildly Significant	2
Top management support	6.5000	Moderately Significant	3
Effective Strategic Planning	6.2500	Moderately Significant	3
Adequate funding throughout the Project	4.9836	Mildly Significant	2
Comprehensive Contract documentation	7.3750	Moderately Significant	3
Up to date technology utilization	7.0978	Moderately Significant	3
Client's experience	6.9260	Moderately Significant	3
Nature of client (Funding and Organizational structure)	8.8642	Most Significant	4
Client's knowledge of construction project organization	4.9444	Mildly Significant	2
Client's confidence in construction team	7.6976	Most Significant	4
Owner's construction sophistication	8.1234	Most Significant	4
Client's project management	7.9876	Most Significant	4
Client's ability to make decision	7.6358	Most Significant	4

Client's ability to define roles	4.6636	Mildly Significant	2
Awarding bids to the right designer/contractor	6.4012	Moderately Significant	3
Design team experience	4.7428	Mildly Significant	2
Project design complexity	7.5428	Most Significant	4
Adequacy of plans and specifications	8.5142	Most Significant	4
Accurate initial cost estimates	6.7428	Moderately Significant	3
Contractor experience	7.9142	Most Significant	4
Site management	7.9142	Most Significant	4
Contractor's cash flow	8.1714	Most Significant	4
Effectiveness of cost control system	6.7428	Moderately Significant	3
Speed of information flow	5.1000	Moderately Significant	3
Project Manager's competence	6.3278	Moderately Significant	3
Project Manager's experience	6.8196	Moderately Significant	3
Project Manager's authority to take day-to-day decisions	4.5957	Mildly Significant	2
Project Manager's authority to take financial decision, selecting key team members, etc.	4.6286	Mildly Significant	2
Technical capability of project manager	6.6072	Moderately Significant	3
Leadership skills of project manager	6.2858	Moderately Significant	3
Organizing skills of project manager	6.6072	Moderately Significant	3
Coordinating ability and rapport of project manager with contractors/ subcontractors	4.4262	Mildly Significant	2
Coordinating ability and rapport of project manager with owner/ owner representatives	4.6886	Mildly Significant	2
Motivating skills of project manager	5.1476	Moderately Significant	3
Project manager's commitment to meet quality, cost and time	6.7214	Moderately Significant	3
Project manager's early and continued involvement in project	5.2460	Moderately Significant	3
Project manager's adaptability to changes in project plan	7.0820	Moderately Significant	3
Construction control meetings	6.3934	Moderately Significant	3
Continuing involvement of stakeholders in the project	4.7428	Mildly Significant	2
Overall	**6.6322**	Moderately Significant	3

Key

Mean Factor Score Range	**KFI**	**Success Level**
1.0 – 2.5	1	Least Significant

>2.5 – 5.0	2	Mildly Significant
>5.0 – 7.5	3	Moderately Significant
>7.5 – 10.0	4	Most Significant

The results in Table 15 indicate that on overall the various factors influencing project success investigated were moderately significant (mean score of 6.6322). The different aspects of the indicators of project success factors that were ranked by respondents to be most significant include nature of client (Funding and Organizational structure), adequacy of plans and specifications, human skill availability, upfront planning efforts, developing an appropriate structure, technology availability, political environment, contractor's cash flow, industrial relations environment, owner's construction sophistication, client's project management, communication systems, economic environment, social environment, contractor experience, site management, control of subcontractor work, client's confidence in construction team, client's ability to make decision, coordination effectiveness, control mechanism, risk identification and allocation and project design complexity.

From the study adequacy of funding was ranked among the moderately significant factors. Other moderately significant factors are project delivery system (e.g. design-bid-build, design build), implementing Quality Assurance (QA) programs, holding of regular meetings, comprehensive contract documentation, decision making effectiveness, project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding), developing standard procedures/absence of bureaucracy, up to date technology utilization, troubleshooting, client's experience, clear objectives and scope, implementing safety program, physical work environment, accurate initial cost estimates, effectiveness of cost control system, quality assurance program, prior project management experience, top management support, awarding bids to the right designer/contractor, effective strategic planning, formal dispute resolution process, X-Factor (fraudulent practices, corruption, favoritism, lack of ethics, etc.), safety program and speed of information flow.

The respondents further ranked the mildly significant factors to be adequate funding throughout the project, commitment to project, client's knowledge of construction project organization, project contract mechanism (e.g. lump sum, unit price, cost plus, etc.), design

team experience, client's ability to define roles, commitment of all parties to the project, feedback capabilities, monitoring and updating plans, administrative approvals environment, project manager's competence, project manager's experience, technical capability of project manager, leadership skills of project manager, organizing skills of project manager, motivating skills of project manager, project manager's commitment to meet quality, cost and time, project manager's early and continued involvement in project, project manager's adaptability to changes in project plan, construction control meetings, project manager's authority to take day-to-day decisions, project manager's authority to take financial decision, selecting key team members, etc., coordinating ability and rapport of project manager with contractors/ subcontractors, coordinating ability and rapport of project manager with owner/ owner representatives and continuing involvement of stakeholders in the project.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This is the final chapter in this study which gives the summary of the findings, the conclusions and recommendations of the study based on the objective of the study. It comes after identifying the background, problem at hand and the objectives in chapter one, literature review was done in chapter two, chapter three set out the methodology that the study used to collect data and chapter four analyzed the data obtained from the study. The chapter finally presents the suggestions for further studies. The study sought to identify business-related factors that influence success of KURA construction projects, to establish the project procedures factors that influence success of KURA construction projects, to establish the project management factors that influence success of KURA construction projects and to identify human-related factors that influence success of KURA construction projects.

5.2 Summary of key findings

This study found that there is much significant relationship between business related factors and the success of construction projects in KURA. Human skills availability, technology availability, political environment, industrial relations environment, economic environment and social environment are much significant in determining the success of construction projects. The study also revealed that adequacy of funding and physical work environment are very significant. X-Factor (fraudulent practices, corruption, favoritism, lack of ethics, etc.) as well as commitment of all parties to the project are rated to be moderately significant while administrative approvals environment is just significant.

The study established that there is a significant relationship between project procedure factors on the success of projects within the construction industry. From the study it was

clear that control mechanism and project delivery system (e.g. design-bid-build, design build) is highly significant as well as project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding), troubleshooting and quality assurance program. The study also ascertained that safety program, project contract mechanism (e.g. lump sum, unit price, cost plus, etc.) and feedback capabilities to be moderately significant in the success of construction projects.

The study found out that project management factors are also influential in the success of construction projects. From the study, upfront planning efforts as well as developing an appropriate structure, communication systems, control of subcontractor work, coordination effectiveness and risk identification and allocation are highly significant in the success of construction projects. Further, implementing QA programs, holding of regular meetings, comprehensive contract documentation, decision making effectiveness, developing standard procedures/absence of bureaucracy, up to date technology utilization, clear objectives and scope is highly significant, implementing safety program is highly significant and prior project management experience and top management support are highly significant in the success of construction projects. Other factors that are quite significant include effective strategic planning and formal dispute resolution process, while adequate funding throughout the project and commitment to project are moderately significant and monitoring and updating plans is just significant in the success of projects.

The study found that human related factors including client-related factors, design team-related factors, contractor-related factors and project manager-related factors have an influence on the success of construction projects. Nature of client (funding and organizational structure) and owner's construction sophistication, client's project management, client's confidence in construction team and client's ability to make decision are very significant in determining the success of projects. Further, client's experience and awarding bids to the right designer/contractor are found to be quite significant, while client's knowledge of construction project organization and client's ability to define roles are moderately significant in the success of construction projects. On design team-related factors, adequacy of plans and specifications and project design complexity are very

significant accurate initial cost estimates to be just significant and design team experience to be moderately significant.

The study further established that contractor-related factors such as contractor's cash flow, contractor experience and site management are very significant; Contractors' effectiveness of cost control system is just significant, while speed of information flow is moderately significant. On project manager-related factors, project manager's adaptability, project manager's experience, project manager's commitment to meet quality, cost and time, technical capability of project manager and organizing skills of project manager are found to be significant; Construction control meetings, project manager's competence and leadership skills of project manager are quite significant; project manager's early and continued involvement in project, motivating skills of project manager, continuing involvement of stakeholders in the project, coordinating ability and rapport of project manager with owner/ owner representatives, project manager's authority to take financial decision, selecting key team members, etc., and project manager's authority to take day-to-day decisions are moderately significant, while coordinating ability and rapport of project manager with contractors/ subcontractors is just significant.

5.3 Discussions of key findings

This study focused on investigating the influential factors on the success of the construction projects. A construction project is commonly acknowledged as successful when it is completed on time, within budget, and in accordance with specifications and to stakeholders' satisfactions. The findings of this study emphasized that success factors vary across various projects. This section therefore focuses on a detailed discussion of the major findings of the study which also entails comparing the study findings to the literature in order to come up with comprehensive conclusion.

5.3.1 Business-Related Factors

With regard to the influence of business-related factors on the success of KURA construction projects, the study found that human skills availability, technology availability,

political environment, industrial relations environment, economic environment and social environment are much significant in determining the success of construction projects. Other factors in this category include adequacy of funding and physical work environment, X-Factor (fraudulent practices, corruption, favoritism, lack of ethics, etc.), commitment of all parties to the project and administrative approvals environment. These findings agree with Walker and Vines (2000) who supported the operating environment as a factor affecting the project success. They used various attributes to measure the influence of business environment factors which are economic environment, social environment, political environment, physical environment, industrial relation environment and level of technology advanced. On the same, White and Fortune (2002) emphasized that adequate funding through the project, comprehensive contract documentation, availability of resources, continuing involvement of all stakeholders in the project, and competent project manager are obvious imperatives to carry out projects. Further, the critical success factors in Sanvido et al. (1992) were a series of contracts that allows and encourages the various specialists to behave as a team without conflicts of interest and differing goals.

5.3.2 Project Procedure Factors

The study established that the project procedure factors have an influence on the success of construction projects. The project team concern themselves with attainment of quality projects which is considered as a function of the procedures adopted during the construction process. Various aspects involved here are control mechanism and project delivery system (e.g. design-bid-build, design build), project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding), troubleshooting, quality assurance program, safety program, project contract mechanism (e.g. lump sum, unit price, cost plus, etc.) and feedback capabilities. These findings correlate with Serpell and Alarcon (1998) that procedures comprise the concept of procurement form and the method of tendering that place great dependence on the project team in setting up the building process and bringing the project to a successful conclusion. Walker and Vines (2000) echoed the same views that the variables in project management include adequate communication, control mechanisms, feedback capabilities, troubleshooting, coordination effectiveness, decision making

effectiveness, monitoring, project organization structure, plan and schedule followed, and related previous management experience. This project identified the effect of different project characteristics, which included people, process and project aspects, on the occurrence of contract disputes. In order to enhance change, an increased understanding of how different project procedures affect different aspects of project performance is vital.

5.3.3 Project Management Factors

The study revealed that the project management factors are also influential in the success of construction projects. Project management is the integral of the entire construction project functions which include coordination of subcontractors, scheduling, cost control, labor relation, billing, purchasing, expending, and other functions related to the project. These projects related factors involve upfront planning efforts, developing an appropriate structure, communication systems, control of subcontractor work, coordination effectiveness, risk identification and allocation, implementing QA programs, holding of regular meetings, comprehensive contract documentation, decision making effectiveness, developing standard procedures/absence of bureaucracy, up to date technology utilization, clear objectives and scope is highly significant, implementing safety program is highly significant and prior project management experience and top management support among others. According to Phua and Rowlinson (2004) the use of project management techniques is very important in the construction industry. because the coordination and use of the many types of labor, skills, materials, and equipment which are used in construction, require daily application of proper project management techniques. As such, the degree of project management factors can be reflected in the range and type of control mechanisms set up for the particular problem.

On the same note, Anvuur and Kumaraswamy (2007) concluded that managerial control (classed as project management factors) is a key element in achieving project success, being significantly related to all measures of success. They highlighted that increased complexity, uncertainty, and time pressure in construction projects have increased the need for cooperation among different project actors. Accordingly, as people become better informed and more aware of what is happening in their project, they will become more involved and

committed to project's progress, and as a consequence, become better motivated. It is therefore clear that, regardless of research scope and context, cooperation is consistently ascribed to be a vital determinant of construction project success. The project participants should truthfully share the project information and obtain different public perspectives regarding their project.

5.3.4 Human Related Factors

From the study, human related factors have an influence on the success of construction projects. Project participants are the key players, including project manager, client, contractor, consultants, subcontractor, supplier, and manufacturers. Nature of client (funding and organizational structure) and owner's construction sophistication, client's project management, client's confidence in construction team and client's ability to make decision are among the factors that influence the success of the construction projects. The client-related factors, design team-related factors, contractor-related factors and project manager-related factors are severally mentioned to have an influence on the success of construction projects. These findings concur with those of Dissanayaka and Kumaraswamy (1999) that client characteristics, client type and experience, knowledge of construction project organization, project financing, client confidence in the construction team, owner's construction sophistication, well-defined scope, owner's risk aversion, and client project management influence the success of construction projects. Chan and Kumaraswamy (1997) considered that design team-related factors consist of design team experience, project design complexity, and mistakes/delays in producing design documents. The main contractor and subcontractors start their main duties when the project reaches the construction stage. The variables include contractor experience, site management, supervision and involvement of subcontracting, contractor's cash flow, effectiveness of cost control system, and speed of information flow.

Belassi and Tukel (1996) pointed out that project manager is a key stakeholder in a construction project and his competence is a critical factor affecting project planning, scheduling, and communication. As such a construction project requires team spirit, therefore team building is important among different parties. Team effort by all parties to a

contract—owner, architect, construction manager, contractor, and subcontractors is a crucial ingredient for the successful completion of a project.

The involvement of many parties is a dominant characteristic of construction projects. According to Eriksson (2008) proper project planning and control require project teams to utilize appropriate project management techniques and tools. Commitment to project and top management support are the other issues related to the commitment component grouping. It has been recognized as one of the most critical factors for the successful completion of projects. Motivation is prerequisite to ensure comfortable working environment within and around project sites.

5.4 Conclusions

The objectives of this research were to define the key success factors that lead to project success and provide a forecasting tool to enable parties to rapidly assess the possibility of a successful project from their viewpoint. These, general objectives were met through the accomplishments of the research. More importantly, a list of specific key factors was identified as critical to the success of projects. The top twenty (20) key success factors (across the seven categories given above) are shown below;

Nature of client	8.8642
Adequacy of plans and specifications	8.5142
Human Skill availability	8.38
Upfront planning efforts	8.3158
Developing an appropriate structure	8.3008
Technology availability	8.2
Political environment	8.1714
Contractor's cash flow	8.1714
Industrial relations environment	8.1604
Owner's construction sophistication	8.1234
Client's project management skill	7.9876
Communication systems	7.9398
Economic environment	7.9142
Social environment	7.9142
Contractor experience	7.9142
Site management	7.9142

Control of subcontractor work	7.9098
Client's confidence in construction team	7.6976
Client's ability to make decision	7.6358
Coordination effectiveness	7.5834

5.5 Recommendations for Policy and Practice

5.5.1 Recommendations for Policy Actions

From the findings and conclusion, the study recommends that:

i. For a project to be successful there must be an improved appreciation of the role of project management within projects, and this role must be placed within the context of a wider project alongside other outside criteria and long-term expectations.

ii. Overall, Project planning, optimal Human Capital deployment, organizational structure that supports projects and adequate finances need to be in place for any successful project.

iii. There should be monitoring and evaluation at all stages of project implementation including concept and design stages, thorough project feasibility studies, formulation of policies to minimize political interference in the project life cycle, monitoring of procurement process, adequate and proper design of projects, proper specialization of duties, tasks and responsibilities, transparency and accountability of workers, proper financial planning and capacity building for staff.

iv. Selecting the right project at the outset and screening out potentially unsuccessful projects, will be more important to ensuring total project success.

v. Project success can be assured by identifying and eliminating the factors that cause poor project performance. Thus, project managers need better understanding of critical success/failure factors and how to measure them.

5.5.2 Recommendations for Management Structure and Practice

From the findings and conclusion, the study recommends that:

i. Organizations must provide clear guidance on how to measure the outcome of an construction project.

ii. Alignment between company's objectives and projects is crucial. Poor alignment can lead to wasted effort and resources despite completing a project within the triple constraints.

iii. The project managers must always bear in mind that successful project management techniques will contribute to the achievement of projects, but project management will not stop a project from failing to succeed. The right project will succeed almost without the success of project management, but successful project management could enhance its success.

iv. A good relationship between client and project team is fundamental to project success. Projects require a collaborative environment and not an adversarial one.

v. Integrating technology into project management process could be one of the best ways that contribute to project success. When team members see their test results and work progress immediately, they are more likely to be interested and motivated towards the outcome.

vi. Project managers need to be aware of their project technology preferences and provide the tools and equipment to the project team as they can be more motivated. Implementation of technological systems can either act as a medium for change or be the means of achieving a desired change in a project.

5.6 Recommendations for Further Studies

From the study and related conclusions, the researcher recommends:

i. This research focuses on the key success factors (KSF) and not on the measurement of project success, i.e., the key performance indicators (KPIs). Further study should be directed to identify the KPIs, so that the causal relationships between KSFs and KPIs can be identified. The causal relationships, once identified, will be a useful piece of information to implement a project successfully. It can help in selecting project team members, identifying the development needs of the project team members, and most important for forecasting the performance level of a construction project before it commences.

ii. Further research should be conducted all construction firms to investigate into the challenges facing project implementation. The same study should also be conducted in other types of organizations.

iii. Another research in the area of the influence of governance structures on project implementation and project success can be conducted.

iv. Further studies should also be done on the factors affecting stakeholders involvement in project management

REFERENCES

Adenikinju, A. (2005). Productivity performance in developing countries. Country case studies, *Occasional paper*, Nigeria

Anderson, C.R. (1984), Mana*gement: Skills, Functions, and Organization Performance*, William C. Brown Co., Dubuque, IA

Ashley, D.B. (1986). New trends in risk management, *paper presented at the Internet's 10th International Expert Seminar on New Approaches in Project Management*, Zurich, 10-12 March.

Assaf Said A, Bubshait AbdulAziz.A, Atiyah Sulaiman and Al-Shahri, Mohammed, (2001), The Management of construction company overhead costs, International Journal of project Management, Vol. 19, PP. 295-303.

Beale, P. and Freeman, M. (1991) Successful project execution: a model. *Project Management Journal*, 4, December, pp. 23-30.

Belassi, W. and Tukel, O.I. (1996), "A new framework for determining critical success/failure factors in projects", International Journal of Project Management, Vol. 14 No. 3, pp. 141-51.

Belassi, W. and Tukei, O. (1996). A new framework for determining critical success/ failure factors in projects. *International Journal of Project Management*, 14(3):141–152.

Caudron, S. (1999). The looming leadership crisis, *Workforce*, Vol. 76 No. 9, pp. 72-9.

Chan, A., Chan, D. and Ho, K. (2003) 'An Empirical Study of the Benefits of ConstructionPartnering in Hong Kong'. *Construction Management and Economics,* 21 (5), 23-533.

Chan, A. P. C. (1992) Managing responsibilities of project managers. *Australian Institute of Building Papers*, 5, pp. 109-119.

Chan, A.P.C (1996a). Quality assurance in the construction industry, *Architecture Science Review*, Vol. 39 No.2, pp.107-12.

Chan Daniel M. M. and Kumaraswamy Mohan M., (2002), Compressing construction durations: lessons learned from Hong Kong building projects, *International Journal of Project Management*, Vol.20, PP. 23.35

Cheng, E. W., Hengi Li and Love P. (2000) Establishment of critical success factors for construction partnering. *Journal of Management in Engineering*, 16(2), pp. 84-92.

Chua, D.K.H., Kog, Y.C. and Loh, P.K. (1999), "Critical success factors for different project objectives", Journal of Construction Engineering and Management, ASCE, Vol. 125 No. 3, pp. 142-50.

Chua, D. K. H., Loh, P.K., Kog, Y.C., Schmitt, H.M., Piehler, J., Gauglitz, G. and Bretch, A. (1997) Neural networks for construction project success. *Expert Systems with Applications*, 13(4), pp. 317-328

Clarke, A. (1999). A practical use of key success factors to improve the effective of project management. *International Journal of Project Management*, 17(3):139–145.

Cooke-Davies, T. (2002). The real success factors in projects. *International Journal of Project Management*, 6(3):164–170.

Davenport, D. (1995), "Assessing the efficiency of international procurement systems in order to improve client satisfaction with construction investments: the French experience", *Proceedings of CIB W92 Symposium "East meets West"*, pp.43-51.

Dissanayaka Sunnil M. and Kumaraswamy Mohan M., (1999), Comparing contributors to time and cost performance in building projects, Building and Environment, Vol. 34, PP. 31- 42

Dvir, D., Raz, T. and Shenhar, A.J. (2003). An empirical analysis of the relationship between project planning and project success, *International Journal of Project Management*, Vol. 21 No. 2, pp. 89-95.

Enshassi Adnan, Al-Hallaq Khalid and Mohamed Sherif, (2006), Causes of contractor's business failure in developing countries: The case of Palestine, *Journal of construction in Developing Countries*, Vol. 11, No. 2, PP. 1-14

Ericsson, L. E. (2002) Skärpning Gubbar. SOU 2002:15, Byggkommissionen, Stockholm.

Eriksson, P. E. (2008) Efficient Governance of Construction Projects through Cooperative Procurement Procedures. *Business Administration and Management.* Luleå, Luleå University of Technology.17

Eriksson, P. E. (2008b) 'Achieving Suitable Coopetition in Buyer-Supplier Relationships: The Case of AstraZeneca'. *Journal of Business to Business Marketing,* 15 (4), 425-454.

Hatush, Z. and Skitmore, M. (1997) Evaluating contractor pre-qualification data: selection criteria and project success factors. *Construction Management and conomics*, 15, pp. 129-147.

Hersey, P., Blanchard, K (1982), *Management of Organisational Behaviour: Utilising Human Resources*, 4th ed., Prentice-Hall International, Englewood Cliffs, NJ, .

Israel Glenn D., (2003), Determining sample size, Agricaultural Education and Communication Department, Florida Coorperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida

Iyer, K. and Tha, K. (2006). Critical factors affecting schedule performance: Evidence from Indian construction projects. *Journal of Construction Engineering and Management*, 132(8):871– 881.

Jaselkis, E. and Ashley, D B. (1988) Achieving construction project success through predictive discrete choice models. *in* Association of Project Managers, *Proceedings 9th World Congress Project Management*, September, 4-9, 1988, Glasgow, Scotland, pp. 71-85

Jaselkis, E. and Ashley, D B. (1991) Optimal allocation of project management resources for achieving success. *Journal of Construction Engineering and Management*, 117(2), pp. 321-340.

Kerzner, H. (2006). *Project Management: A Systems Approach to Planning, Scheduling and Controlling, 9th Ed.* Hoboken: John Wiley and Sons Inc.

Kog, Y.C., Chu, D.K.H., Loh, P.K. and Jaselkis, E. (1999) Key determinants for construction schedule performance. *International Journal of Project Management*, 17(6), pp. 351-359.

Kometa, S. T., Olomolaiye, P.O., and Cooper, A.P. (1995) Project success and pre-contract client evaluation in The University of York, *Proceedings of ARCOM, September 18-20, 1995 :The University of York, UK*, pp. 270-276.

Kothari, A. K. (1986) Success in project management. *in* Project Management Institute *Proceedings of the Project Management Institute,* September 20-25, 1986, Montreal, Canada: Drexel Hill, pp. 240-245.

Kumaraswamy, M.M, Dissanayaka, S.M (1998). Linking procurement systems to project priorities, *Building Research and Information*, Vol. 26 No.4, pp.223-38..

Laedre, O., Austeng, K., Haugen, T. and Klakegg, O. (2006) 'Procurement Routes in Public Building and Construction Projects'. *Journal of Construction Engineering and Management,* 132 (7), 689-696.

Lim, E. and Alum, J. (1995). Construction productivity: Issues encountered by contractors in Singapore. *International Journal of Project Management*, 13(1):51–58

Long Duy Nguyen, Stephen O. Ogunlana and Do Thi Xuan Lan Engineering, Construction and Architectural Management Volume 11 · Number 6 · 2004 · 404–413

Loo, R. (2002), "Working towards best practices in project management: a Canadian study", International Journal of Project Management, Vol. 20 No. 2, pp. 93-8.

Malladi, S. (2007). Enhancing project performance and productivity-addressing it in project management and beyond, PM tips and techniques. *PM World Today*, 9(7).

Meyer, A.D., Loch, C.H. and Pich, M.T. (2002). Managing project uncertainty: from variation to chaos, *MIT Sloan Management Review*, Vol. 43 No. 2, pp. 60-7.

Muller, R. and Turner, J. (2005). The project manager's leadership style as a success factor on projects: a literature review. *Project Management Journal*, 36(2):49–61.

Munns, A.K. and Bjeirmi, B.F. (1996), "The role of project management in achieving project success", International Journal of Project Management, Vol. 14 No. 2, pp. 81-7.

Navon Ronie, (2005), Automated project performance control of construction projects, Automation in Construction, Vol. 14, PP. 467. 476

Ngai, S., Drew, D., Lo, H. P. and Skitmore, M. (2002) 'A Theoretical Framework for Determining the Minimum Number of Bidders in Construction Bidding Competitions'. *Construction Management and Economics,* 20 (6), 473-482.

Ngowi, A. (2002), "Challenges facing construction industries in developing countries", Building Research and Information, Vol. 30 No. 3, pp. 149-51.

Phua, F.T.T. and Rowlinson, S. (2004). How important is cooperation to construction project success? A grounded empirical quantification, *Engineering, Construction and Architectural Management*, Vol. 11 No. 1, pp. 45-54

Pinto, J.K. and Slevin, D.P. (1989), "Critical success factors in RandD projects", Research Technology Management, pp. 31-5.

Pinto, J. K. and Slevin, D. P. (1987) Critical factors in successful project implementation. *IEEE Transaction Engineering Management*, EM34, pp. 22-27.

Pinto, J. K. and Slevin, D. P. (1989) Critical factors in R and D projects. *Res. Technol Management*, January-February, pp. 31-35.

Rehman, T. and Ogunlana, S. (2009). Construction professionals' perception of critical success factors for large-scale construction projects. Construction Innovation: Information, *Process, Management*, 9(2):149–167

Sanvido, V., Grobler, F., Parfitt, K., Guvenis, M. and Coyle, M. (1992). Critical success factors for construction projects, *Journal of Construction Engineering and Management*, ASCE, Vol. 118 No. 1, pp. 94-111.

Sanvido, V., Grobler, F., Parfitt, K., Guvenis, M. and Coyle, M. (1992). Critical success factors for construction projects, *Journal of Construction Engineering and Management*, ASCE, Vol. 118 No. 1, pp. 94-111.

Serpell, A., Alarcon, L.F (1998). Construction process improvement methodology for construction projects, *International Journal of Project Management*, Vol. 16 No.4, pp.215-21.

Sidwell, A.C (1984). The time performance of construction projects, *Architectural Science Review*, Vol. 27 pp.85-91.

Takim, R. and Akintoye, A. (2002). A conceptual model for successful construction project performance, paper *A study on project success factors in large construction projects in Vietnam*

Teicholz, P., Goodrum, P., and Haas, C. (2001). U.s construction labour productivity trends 1970-1998. *Journal of Construction Engineering and* Management, 127(5):427–429.

Tiong, R. L. K., Yeo, K.T. and McCarthy, S.C. (1992) Critical success factors in winning BOT contracts. *Journal of Construction Engineering and Management*, 118(2), June, pp. 217-228.

Ugwu O.O. and Haupt T.C., (2007), Key performance indicators and assessment methods for infrastructure sustainability - a South African construction industry perspective, *Building and Environment*, Vol. 42, PP. 665-680

UNRWA, (2006), Projects completion reports, UNRWA, Gaza

UNRWA, (2007), Projects completion reports, UNRWA, Gaza

Voordijk, H., de Haan, J. and Joosten, G.-J. (2000) 'Changing Governance of Supply Chains in the Building Industry: A Multiple Case Study'. *European Journal of Purchasing and Supply Management,* 6 (3-4), 217-225.

Walker, D. H. T. (1995) The influence of client and project team relationships upon construction time performance. *Journal of Construction Procurement*, 1(1), pp. 4-20

White, D. and Fortune, J. (2002), "Current practice in project management – an empirical study", International Journal of Project Management, Vol. 20 No. 1, pp. 1-11.

White, D. and Fortune, J. (2002). Current practice in project management – an empirical study, International Journal of Project Management, Vol. 20 No. 1, pp. 1-11.

Zimmerer, T.W. and Yasin, M.M. (1998). A leadership profile of American project managers, *Project Management Journal*, Vol. 29 No. 1, pp. 31-8.

APPENDICES

Appendix I: Introduction Letter

Lepartobiko Wilson

P.O. Box 9085 - 00200

Nairobi.

October 11th, 2012

Dear Sir/Madam,

RE: REQUEST FOR PARTICIPATION IN A RESEARCH STUDY

I am a final MA degree student at the University of Nairobi. My area of specialization is Project Planning and Management. I am currently undertaking a research on "**Factors that Influence Success in Large Construction Projects: The Case of Kenya Urban Roads Authority Projects**".

I would be grateful if you could spare some time from your busy schedule and complete the enclosed questionnaire. All the information provided will be used purely for academic purposes only and will be treated with utmost confidentiality.

Thank you for your cooperation.

Yours faithfully,

Lepartobiko Wilson

L50/71812/2008

Appendix II: Survey Questionnaire – Project Success Factors

SECTION ONE

1 Project Title : .....

2 Project Location : .....

3 Project Description : .....

4 Contract Sum : .....

5 Commencement Date : .....

6 Project Period : .....

Revised Project Period : .....

7 Completion Date : .....

Revised Completion Date : .....

SECTION TWO

8. Respondent Designation.....

9. Level of Education
   1) O Level
   2) Certificate
   3) Diploma
   4) Undergraduate degree
   5) Masters and above

10. Experience in Construction management

.....

.....

11. Project stakeholder position
   1) Client/owner
   2) Contractor
   3) Consultant

12. How many years involved in construction ☐ 0-15 ☐ 5-10 ☐ 10-15 ☐ >20

13. Nature of the other projects handled: Public ☐ ☐ Private

SECTION THREE

The table below consists of factors which may be key to the success or failure of a project. Based on the project for....., Please rate these factors on a sale of 1 to 10 with 1 being the lowest rank (not significant) and 10 being the highest rank (Extremely significant).

Factor	Rating	Comments, If Any
Business Related Factors		
Commitment of all parties to the project		
Adequacy of funding		
Technology availability		
Human Skill availability		
X-Factor (fraudulent practices, corruption, favoritism, lack of ethics, etc.)		
Economic environment		
Social environment		
Political environment		
Physical work environment		
Industrial relations environment		
Administrative approvals environment		
Project procedures		
Project delivery system (e.g. design-bid-build, design build)		
Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding)		
Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.)		
Control mechanism		
Feedback capabilities		
Troubleshooting		
Quality assurance program		
Safety program		
Project Management Factors		
Communication systems		
Upfront planning efforts		
Monitoring and updating plans		
Developing an appropriate structure		
Control of subcontractor work		
Implementing safety program		

Implementing QA programs		
Coordination effectiveness		
Decision making effectiveness		
Clear objectives and scope		
Holding of regular meetings		
Developing standard procedures/absence of bureaucracy		
Prior project management experience		
Risk identification and allocation		
Formal dispute resolution process		
Commitment to project		
Top management support		
Effective Strategic Planning		
Adequate funding throughout the Project		
Comprehensive Contract documentation		
Up to date technology utilisation		
Human-Related Factors		
Client-related Factors		
Client's experience		
Nature of client (funding and organizational structure)		
Client's knowledge of construction project organization		
Client's confidence in construction team		
Owner's construction sophistication		
Client's project management		
Client's ability to make decision		
Client's ability to define roles		
Awarding bids to the right designer/contractor		
Design team-related Factors		
Design team experience		
Project design complexity		
Adequacy of plans and specifications		
Accurate initial cost estimates		
Contractor-related factors		
Contractor experience		
Site management		
Contractor's cash flow		
Effectiveness of cost control system		
Speed of information flow		
Project Manager-related Factors		
Project Manager's competence		
Project Manager's experience		
Project Manager's authority to take day-to-day decisions		
Project Manager's authority to take financial decision, selecting key team members, etc.		

Technical capability of project manager		
Leadership skills of project manager		
Organizing skills of project manager		
Coordinating ability and rapport of project manager with contractors/ subcontractors		
Coordinating ability and rapport of project manager with owner/ owner representatives		
Motivating skills of project manager		
Project manager's commitment to meet quality, cost and time		
Project manager's early and continued involvement in project		
Project manager's adaptability to changes in project plan		
Construction control meetings		
Continuing involvement of stakeholders in the project		