DETERMINANTS OF SUCCESSFUL DELIVERY OF HOUSING CONSTRUCTION PROJECTS IN THE MINISTRY OF HOUSING IN NAIROBI, KENYA

BY

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DECLARATION

I declare that this is my original work and has not been submitted for examination in any other University.

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LIST OF ABBREVIATIONS AND ACRONYMS

CPD	Continuous Professional Development
CSHS	Civil Servant Housing Scheme
CSHSF	Civil Servants Housing Scheme Fund
CSFs	Critical Success Factors
CSO	Central Statistics Office
GDP	Gross Domestic Product
GOK	Government of Kenya
ICT	Information Communications and Technology
IT	Information Technology
KNBS	Kenya National Bureau of Statistics
KPI	Key Performance Indicators
LFM	Logical Framework Method
MrS	Market Success
NEMA	National Environment Management Authority
PDF	Portable Document Format
PMBoK	Project Management Body of Knowledge
PMI	Project Management Institute
PMS	Project Management Success
PrS	Product Success

SPSS	Statistical Package for Social Sciences
UNEP	United Nations Environmental Programme

OPERATIONAL DEFINITION OF TERMS

Critical success factors are defined as those few; typically four or five issues fundamental to the achievement of success on projects.

Key performance indicators are the key measurable evidence necessary to prove that a planned effort has achieved the desired result.

Project is the achievement of specific objectives, which involves a series of activities and tasks which consume resources and has to be completed within a set specification and budget, having a definite start and end dates.

Project management is the activity series performed in order to initiate, plan, control and terminate the project execution activities.

Project management success is measured against the traditional measures of performance against cost, time and quality.

Project success is measured against the overall objectives of the project

Project success criteria are the set of principles or standards by which project success can be judged.

Project success factor is a circumstance, fact, or influence contributing to the success of the project. They are those inputs to the management system that lead directly or indirectly to the success of the project.

ABSTRACT

The concept of project success remains unclearly defined due to different expectations from different stakeholders. The well-known success criteria of time, cost and quality do not provide any practical information of achieving project objectives in an efficient way. Identification of the main factors contributing to project success will gain particular importance for stakeholders in the light of highly competitive environment of housing construction since housing construction projects represent one of the largest sectors in the construction industry in the country. Indeed the Kenya Vision 2030 strategy (2007) outlines the housing sector as having a crucial role to play in the achievement of the envisaged goals. The success of the industry is therefore important to a growing economy like Kenya. The main aim of this research project was therefore to identify rank and analyse the interrelationships between the most influential factors affecting the successful delivery of housing construction projects in the Ministry of Housing in Nairobi, Kenya. The study focused on five projects undertaken by the Civil Servants Housing Scheme in the ministry. Three different target populations segmented into four specialized groups that were involved in the construction project management process for the ministry in the past five years and the beneficiaries of the projects were the target. The groups were the project management team, the consultants' team comprising, the construction team and the project beneficiaries. A census of the entire target population for the project participants was earmarked for the study while simple random sampling was used to identify respondents from the beneficiaries of the projects. The sample design represented a total of 120 respondents. A questionnaire designed with both matrix and open ended questions was administered to the respondents and from the 120 questionnaires sent out, 81 were received representing 67.5% response rate. Based on the analysis of the data using SPSS computer software, success factors were ranked according to their impact on project success. Further, factor analysis was used to study the interrelationship between the factors. From the initial 72 variables, 29 factors were extracted and 16 factors were identified as critical determinants. The top 5 were: 'contractors experience', 'contractor's cash-flow', 'site management', 'employer's ability to honour contractor's certificates on time' and 'adequacy of funding from external sources'. Three of these are related to project funding, while the other two concerns the contractors' experience and effective site management. Funding is therefore a critical factor for public projects, therefore implementing organisations must have clear funding structures for the projects to succeed. The research findings will contribute practically in the successful project implementation at the ministry and other public project oriented organisations, while theoretically the findings will be invaluable to other related policy makers and to the project management field of study. The current research may be developed further by increasing the sample size and studying the area more in depth by deploying different methodology. Increasing the sample size could help to identify more precisely the interrelation framework of success factors. This can provide a significant contribution to the existing literature by adding knowledge to the project management theory in a developing economy like Kenya. Finally as this study was focused on a specific type of project in one country, and a limited location within one organisation, the research is not able to provide generalization regarding the construction industry as a whole. This may be the main limitation of this study since the conclusions cannot be applied to other organisations.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

It has been recognized over the last thirty years that project management is an efficient tool to handle novel or complex activities (Munns and Bjeirmi, 1996). Indeed as early as the 1960s project management had already been perceived to be more efficient than traditional methods of management such as the practice of functional divisions in a formal hierarchical organization (Avots, 1969). Shenhar, Reiner and Wideman (1996), state that historically project management responded to the need to create civil and building works of some complexity. However with time, project management achieved greater prominence when the planning and control concept were applied to much more complex projects. It is therefore noteworthy that in the last couple of decades, project management has emerged as a business process tool.

According to Nwachukwu and Emoh (2011) the case for project management is believed to be justified as a means of avoiding the ills inherent in the construction and production sectors of the economy and for which reasons most construction projects fail and or abandoned. Ika (2009) adds however that project management offers organizations the means to be efficient, effective, and competitive in a shifting, complex, and unpredictable environment. He further infers that project management has a specific nature in that it is a professional and scientific specialization that differs from traditional management by the generally limited, temporary, innovative, unique, and multi-disciplinary nature of projects. It is widely recognized that project management requires its own tools and techniques (Munns and Bjeirmi, 1996).

Perkin, Peterson and Smith (2003) on the other hand have described project management as a discipline that employs skills and knowledge to achieve project goals through various project activities and involves controlling costs, time, risks, project scope, and quality through project management processes. They further identify project management functions as first; planning which establishing the project life cycle and secondly, organizing resources such as personnel,

equipment, materials, facilities, and finances, and thus coordinating work and resources. The other functions are leading which involves assigning the right people to the right job, motivating people, and setting the project's course and goals and lastly controlling which involve evaluating project progress and, when necessary, applying changes to get it back on track.

Projects and project management are now widely recognized by organizations as being essential to achieving their strategic objectives. Achieving strategic objectives often involves change, and that change needs managing in a different way than managing the routine work of the organization. The change can take several forms; for example, it may be an engineering construction, a new building, new infrastructure or a new product or production machinery. It may also be an information system, involving new information and communication technology (ICT) or it may be a social construct, new processes, a new organizations structure, or new skills in the work force. In each case, the organization that wants the new asset creates a temporary organization, a project, to which resources are assigned to do the work to deliver that beneficial change (Turner, 2007).

Lock (2007) in his contribution identifies four types of projects. The first project type is civil engineering, construction, petrochemical, mining and quarrying; which is the focus for this study. He further states that the common feature with these projects is that the implementation phase is usually conducted on a site that is usually exposed to the elements, and usually remote from the contractor's head office. These projects thus incur special risks and problems of organization. The other three types of projects are manufacturing, Information Technology (IT) projects and projects associated with management change. The last of his identified types is projects for pure scientific research. The civil engineering and construction type of projects therefore pose special challenges and yet is significant to the economic and social development of any country.

Primarily, the provision of housing comes through the process of construction. This is important because according to (UNEP, 2011) the construction sector generates significant social and economic benefits by employing over 111 million people worldwide and contributes approximately 10 per cent to the global Gross Domestic Product (GDP). The significance of this

sector has been appreciated in countries Kenya can emulate, such as South Korea where it contributed 7.8 per cent to GDP in 2006 (Korea National Statistics Office, 2010). In Malaysia, building and construction has provided a relatively high proportional contribution to employment by sector, where about 10 per cent of all employment in major sectors has been in this sector alone, (Department of Statistics Malaysia, 2011). Further, according to Nwachukwu (2008), the building construction industry is a major factor in the social and political integration of the society and ranks as one of the major budgetary areas of developing economies.

In Kenya, the Vision 2030 underscores the construction sector due to its labour-intensive nature, which gives it high potential to generate more employment and utilize Kenya's comparative advantage in labour abundance. The construction sector also has strong linkages with other sectors of the economy. The housing construction sector for example has a local content of more than 90 per cent, and therefore investment in housing and integrated planning can deliver direct positive effects on national income by triggering forward and backward linkages through additional investments in manufacturing of building materials, transport, marketing, and infrastructure development (Government of Kenya, 2007). The Vision 2030 further recognizes infrastructure development as the main foundation on which the economic pillar will be implemented and therefore gives it a very high priority in the planning process (Government of Kenya, 2007). According to KNBS (2011), activities of the construction sector expanded substantially mainly supported by increased bank credit for real estate development to the private sector. Consequently, the sector recorded an impressive growth of 10.7 per cent in first quarter of 2011.

Construction is therefore important both to the global and national economies. Construction projects, like all projects, usually involve combining the efforts of a number of people both professionals and non-professionals to achieve some set objectives against a fixed timescale and budget. According to Winch (2002) therefore, construction project management is a process of finding and using the right information required for decision making. Nwachukwu and Emoh (2011) add that building construction projects must be made to succeed because its execution often involves substantial funds. The successful delivery of any building project then depends on the strategy for success adopted by the organization responsible for its implementation and

execution. The strategies for success in any building project are implemented in the management of project time, cost, quality and material management using the project life cycle concept (Nwachukwu and Emoh, 2011).

Secondly, housing as a human basic need, is a very important issue of people's everyday lives. In 1948, the United Nations, in its Universal Declaration of Human Rights, stated that; "everyone has the right to a standard of living adequate for the health and well-being of himself and of his family including food, clothing, housing and medical care and necessary social services." According to Bakar et al. (2010) housing provision is one of the major challenges facing developing countries. In order to provide housing for its population, governments all over the world must facilitate the process of housing construction. Housing therefore is one of the end products of a construction process. The process is so important that it forms a major industry or sector that is vital for the development of any nation.

Housing construction projects represent one of the largest sub-sectors of the construction industry in Kenya (GOK, 2007). The construction projects are taken to be dynamic and challenging and are often characterized as complex, costly, time consuming and risky. The Kenya Vision 2030 strategy outlines the housing sub-sector as having a crucial role to play in the achievement of the envisaged strategic goals (GOK, 2007). According to the Kenya National Bureau of Statistics (2009), the housing sector has been characterized by inadequacy of affordable and decent housing, low level of urban home-ownership, extensive and inappropriate dwelling units, including slums and squatter settlements. The Ministry of Housing has been mandated to facilitate development of housing and improve the living conditions of Kenyans.

The Ministry of Housing is a strategic player in facilitating development and management of quality and affordable housing for Kenyans. The mandate of the Ministry, as spelt out in the Presidential Circular No. 1 of 2008, includes among others the development of housing through National Housing Corporation and facilitating Civil Servants to own houses through the Civil Servants Housing Scheme Fund. This fund has been in existence since the year 2004, and is utilized for development of housing units for sale or rental by civil servants (GOK, 2009). The

delivery of these housing units to the beneficiaries should therefore meet certain criteria to be seen to be successful.

From the foregoing it is clear that building construction projects are major catalyst for economic and social growth. The process of implementing these projects must be made to succeed because their execution often involves substantial funds whose lose can have crippling effects. According to Nwachukwu and Emoh (2011), achieving success in building implementation process is a major function of project management. Lock (2007), adds that the project manager of a typical project would consider the task well done if the project finished on time, according to its specified performance and within its budgeted cost. These three objectives are traditionally the basic parameters for measuring successful delivery of projects.

However Nwachukwu and Emoh (2011), observe that in most cases, both public and private building construction projects are hardly completed on time, within cost, quality and material specification. According Mobey and Parker (2000) as cited in Bakar et al. (2010), to increase the chances of a project succeeding, it is necessary for the organisation to have an understanding of what are the success factors, to systematically and quantitatively assess these factors, anticipating possible causes and effects, and then choose appropriate methods of dealing with them. It is therefore important for an organisation to define project success criteria specific to their projects and identify factors that will contribute towards this success.

1.2 Statement of the Problem

Tabish and Jha (2011) have stated that modern public housing construction projects involve multiple stakeholders such as consultants, contractors and subcontractors, construction managers and specialists from different disciplines. With such a multi-agency work environment, it is natural to have a clash of objectives and interests among the different stakeholders. They further observe that the objective of public project management is to ensure the success of a project which not only involves managing the schedule, cost, and quality, but also satisfying a number of other performance criteria (Tabish and Jha, 2011). According to Aibinu and Jagboro (2002), a major criticism facing the construction industry especially in the developing economies like

Nigeria and Kenya, is the growing rate of delays in project delivery. Timely delivery of projects within budget and to the level of quality standard specified by the client is an index of successful project delivery (Chan and Kumaraswamy, 1997).

In Kenya, the current National Housing Policy which is being implemented by the Ministry of Housing is in line with the country's Vision 2030 for housing and urbanization (GOK, 2007). The vision requires an increase in the annual production of housing units to be stepped up from the current 35, 000 units to 200,000 units annually as a medium term goal up to the year 2012. As a result the construction of many housing projects is expected during the plan period. The successful delivery of these projects is therefore crucial in realizing the objectives of the vision.

As stated earlier, the Ministry of Housing is involved directly in provision of housing for sale and rental specifically to the civil servants through the Civil Servants Housing Scheme Fund. Already the first phase which was implemented entirely in different zones in the City of Nairobi is almost complete and the second phase which will cover other major towns is about to commence. It is therefore important to study the completed phase and determine whether it was successful, and identify which factors may have contributed to the success or failure of the different elements in the project process.

The purpose of the study is therefore to identify and document the determinants of housing construction project success in the ministry and other public sector agencies.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of the research project is to identify the determinants of successful delivery of housing construction projects in the Ministry of Housing in Nairobi, Kenya.

1.3.2 Specific Objectives

The specific objectives of the research project are as follows:

1. To determine how project management factors affect the successful delivery of housing construction projects in the Ministry of Housing.
2. To verify how project participants' factors (client team factors, design team factors, construction team factors and project manager related factors) influence successful delivery of housing construction projects.
3. To find out if procurement related factors affect the successful delivery of housing construction projects.
4. To determine the influence of the business / work environment factors on housing construction projects success.

1.4 Research Questions

In view of the objectives listed above, the following research questions are significant:

1. How do project management factors affect the successful delivery of housing construction projects in the Ministry of Housing?
2. How do project participants' factors (client team factors, design team factors, construction team factors and project manager related factors) influence successful delivery of housing construction projects?
3. How do procurement related factors affect the successful delivery of housing construction projects?
4. Do the business / work environment factors have an influence on housing construction projects success?

1.5 Significance of the Study

The Ministry of Housing is a new comer in the actual process of constructing houses for sale or rental to civil servants. Since the projects were initiated, no attempts have been made to identify and document factors that may have contributed to the outcome of these projects. So far several

of the projects have been completed and handed over to the beneficiaries while the completion of others have delayed beyond the expected dates and budgets exceeded. This study will therefore be useful to the project managers and decision makers in the ministry. They will acquire relevant and critical information on what has affected the delivery of past projects and apply the knowledge towards achieving better success in the planned projects. Secondly the results of the research project will help future researchers to identify the most dedicated philosophy of construction success and attract more researches to enhance the construction project success since this is a significant field of study. Indeed according to Klagegg, Samset, Magnussen (2005), this is a very important subject and there is still a disagreement between project management researchers as to what constitutes project success and how it is to be measured. For the scholars this study will therefore contribute immensely to the project management knowledge and provide a platform for future studies. The study will also be significant to policy makers since the outcome can be used to make decisions that will ensure the public funds on construction projects are utilised efficiently and effectively. Lastly the study will be important to the future beneficiaries since the products of the construction process will be more successful thus responding to the users' needs. The results will therefore be significant to project management practitioners, policy makers, scholars and the beneficiaries of the products.

1.6 Scope of the Study

The scope of the study is bounded by three main characteristics. First the geographical coverage of this study will be focused on the projects undertaken by the Ministry of Housing in Nairobi, Kenya. Only housing construction projects and no other types of construction projects will be considered, therefore forming the second boundary of the scope of this study. This specific boundary excludes other types of construction projects like civil engineering or other infrastructural types of projects. Thirdly the study will be restricted to the projects undertaken by the Ministry of Housing and specifically under the Civil Servants Housing Scheme during the last five to seven years in the City of Nairobi. Regarding this area the scope of the research is limited to identification of the most important factors for housing construction project success as well as identifying any relationship between different success factors. Therefore, the current

study makes an effort to identify which of the factors have the highest influence on housing construction project success in the ministry specifically and in Kenya generally.

1.7 Assumptions

In carrying out this study some assumptions have been made. First, it is assumed that when the questionnaires are sent out to the respondents, they will be willing to spare time and give accurate data. This is very crucial since the accuracy of the study outcome depends on this primary data collection. Secondly it is assumed that the respondents will have been directly involved in at least one of the project life cycles of the housing projects undertaken by the Ministry of Housing. It is further assumed that the project manager and the consultants involved in these projects will be willing to avail relevant project documents to assist the researcher. Last but not least, it is further assumed that the results can be applicable to other public sector projects of similar nature.

1.8 Limitations to the Study

As stated earlier, the study will be restricted to the projects undertaken by the Ministry of Housing and specifically under the Civil Servants Housing Scheme in the City of Nairobi. The researcher has made this decision due to the limited time and resources available for the study. Further the study will be limited to the experience of the respondents through the project life cycle. The researcher therefore plans to reach as many respondents as possible both experts and non-experts, and users to be able to collect data that will determine accurate results of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

The second chapter will focus on literature review from both primary and secondary sources. The review sets the foundation for the study, by identifying what has already been done and gaps that need to be addressed. It begins by discussing an overview of project and project management. This is followed by an examination of project success and project management success and the distinction between them. In addition, success criteria and factors that affect success will be discussed. The review then highlights the use of project management process as a means of delivering project success. The chapter concludes with a conceptual framework which clearly identifies the dependent and independent variables.

2.2 Theoretical Review

2.2.1 An Overview of Project and Project Management

Primarily the focus of this study is projects; especially concerning housing construction. It is therefore important to have a clear understanding what a project is. According to Munns and Bjeirmi, (1996) a project can be considered to be the achievement of specific objectives, which involves a series of activities and tasks that consume resources. It has to be completed within a set specification, having a definite start and end dates. Lundin and Soderholm (1995) on the other hand describe project as a temporary organization and assert the time conception as one of the four distinguishing features of temporary organizations from permanent organizations. The other three distinguishing features are task, team and transition.

Cooke-Davies (2002) adopted a similar approach by defining project as a complex effort to achieve specific objective within schedule and budget target, and typically cuts across organisational lines, is unique, and is usually not repetitive within the organisation. Duncan (2004) on the other hand has described project as a temporary endeavour undertaken to create a

unique product or service. Temporary means that the project has a definite ending point, while unique means that the product or service differs in some distinguishing way from all similar products or services.

Over the years however, as expectations from projects have increased, the definition seems to have evolved. Turner and Muller (2003) for example incorporate the idea of beneficial change that a product of the project is expected to deliver, to their definition of project. They therefore define project as a temporary organisation that aims to create a unique service or product that brings added value or delivers beneficial change (Turner and Muller, 2003).

In summary; 'defined start and end', 'a common objective' and 'complex set of activities' are the three most common features that are shared by every project and thus present in almost every project definition. Projects are therefore concerned with defining and selecting a task that will be of overall benefit to the organisation or the target client. According to Munns and Bjeirmi (1996), the benefit will tend to be of a long term nature, oriented towards the life span of the completed project. In the case of construction projects, the benefits could be extended over 50 years, depending on the anticipated life of the building.

However project objectives are achieved through the process of project management. Munns and Bjeirmi, (1996) have stated that the function of project management includes defining the requirement of the work, allocating resources required, planning the execution of the work, monitoring the progress of the work and adjusting deviations from the plan. Cooke-Davies (2002) in his contribution defines project management as the activity series performed in order to initiate, plan, control and terminate the project execution activities. Practitioners, on the other hand have defined project management, as 'the application of knowledge, skills, tools and techniques in order to meet or exceed stakeholder requirements from a project' (PMBoK, 2004).

In addition, Cooke-Davies (2002) points out to the fact that the distinction between project execution and project management may not always be clear cut. For example a site meeting of personnel in a construction site can be regarded as an element of both project execution and project management. He therefore, remarks that this obscure distinction may pose problems in

assessing the success of a project. It is therefore clear that project management, which involves project planning, monitoring, controlling and motivation, has vital implications on a project's success. Lastly, Gardiner (2005) summarises project management definition into two key points of 'managing' and 'successfully'. He argues that 'managing' refers to 'planning, monitoring, controlling and motivation', whereas, 'successfully' refers to 'on time, within cost, to quality and to performance' (Gardiner, 2005).

2.2.2 Project Success Components

Although project success is a core project management concern, according to Baccarini (1999), it has no standardized definition. The success of a project is perceived differently by different success assessors. However according to Pinto and Slevin (1988) based on their study conducted with over 650project managers, project success is not only meeting cost, schedule, and performance requirements; rather it requires satisfaction of more complex specifications, such as client satisfaction. Good schedule and cost performance means very little in the face of a poor performing end product. De Wit (1988) as cited in Prabhakar (2008) further defines and distinguishes between project success which is measured against the overall objectives of the project and project management success which is measured against the widespread and traditional measures of performance against time, cost and quality. The outcomes of project management success therefore include the obvious indicators of completion to budget, satisfying the project schedule, adequate quality standards and meeting the project goal. This definition suggests a short term and more specific context of success. It is therefore possible for a project to be successful despite the failings of project management because it meets the higher and long-term goals as discussed earlier.

Finally, another attempt at developing a viable foundation for project success definition was made by Baccarini (1999), who contributes by his logical framework method (LFM). The LFM model distinguishes between four levels of project objectives, namely goal, purpose, output, and input, and provides a comprehensive framework for defining, as well as, comprehending the project success concept. He further differentiates between project management success and the product success, instead of project success. Product success is related to goals and objectives,

while, project management success is related to the project outputs and inputs. Project success is therefore the sum total of project management success and product success (Baccarini, 1999).

2.2.3 Project Success Criteria

As the perception of success varies from one assessor to another, it is important to set criteria for project success before commencement to help in determining the success or failure of the project. Project success criteria refer to a group of principles or standards used to determine or judge project success. The Oxford Advanced Learner's Dictionary (2000) suggests that a criterion is a principle or standard that a thing is judged by. Further success criteria as defined by Lim and Mohamed (1999) are a set of principles or standards by which project success can be judged. Early research on project success criteria adopted the traditional Iron Triangle of 'time, budget and quality' as the set of principles for evaluating the success of a project. It is noteworthy that several scholars and practitioners accepted this set of success criteria but noted too the necessity to take into consideration other criteria (Turner, 2007). Jugdev and Muller (2005) have more recently, evaluated this set of criteria as being insufficient for assessing the project success comprehensively. They therefore assert that to assess project outcomes only with respect to time, cost and, quality is to consider only operational level project management as opposed to anything of strategic value.

Pinto and Mantel (1990) have therefore included both internal and external aspects of project organization, as well as, complex criteria such as, stakeholder satisfaction, stakeholder community benefits, and organizational benefits in assessing project success. They therefore have proposed two additional success criteria, namely, the quality of the project as it is perceived by the project team and an external performance indicator of both project and its team performance. In the long term, the success of a project should be determined by its performance. Performance indicators or measures are therefore important components of measuring project success. Saqip, Farooqui and Lodi (2008) on the other hand has categorised success criteria as owner's criteria, designer's criteria and contractor's criteria each focusing on a specific performance measure or indicator.

In summary then, a project is termed successful if it passes four success test criteria namely; the time criterion (completed on time); the financial criterion (completed within budget); the effectiveness criterion (completed in accordance with the original set performance and quality standards); and client's satisfaction criterion (accepted by the intended users or clients) whether the client is internal or from outside the organization.

2.2.4 Project Success Factors

Having determined the criteria for success it is important to now turn our discussion to the factors that affect project success. A factor is a circumstance, fact, or influence contributing to a result. Success factors therefore refer to conditions, events, and circumstances that contribute to project results. De Wit (1988) has defined project success factors as those inputs to the management system that lead directly or indirectly to the success of the project or business.

Generally, the success of a construction project depends on a number of factors, such as project complexity, contractual arrangements, and relationships between project participants. The competency of project managers and the abilities of key project members also affect the success of the project (Chua et al., 1999). Over the years, project management researchers have been trying to discover which factors lead to project success. For example Baker, Murphy and Fischer (1988); Pinto and Slevin (1988); and Lechler (1998) have carried out extensive research in this area that is widely reflected in project management literature. However according to Cook-Davies (2000), despite these documented research results project outcomes continue to disappoint stakeholders. Therefore the search for critical factors that contribute to successful projects continues.

According to Prabhakar (2008) to come up with all possible critical factors that might affect outcome is impossible because of the diversity of projects. But to identify the groups to which the critical factors belong would be sufficient for better evaluation of projects. But to identify the groups to which the factors belong would be sufficient for better evaluation of projects. Belassi and Tukel (1996) grouped the success factors listed in the literature and described the impact of these factors on project performance. They grouped the factors into four areas as follows; factors

related to the project, factors related to the project managers and the team members, factors related to the organization and factors related to the external environment. Saqip et al. (2008) adds that a careful study of previous literature suggests that success factors can be grouped under seven main categories. These were listed as project management factors, procurement-related factors, client-related factors, design team-related factors, contractor-related factors, project manager-related factors and business and work environment-related factors. This later list is more specific to construction projects.

2.2.4.1 Project Management Factors

Project management action is a key for project success. 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 (Belout, 1998; 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.

2.2.4.2 Procurement Factors

A number of researchers identified the importance of procurement factors (Pocock et al., 1997a, 1997b; Walker, 1997; 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).This is particularly important since laws regarding public procurement restrict public sector clients' bid invitations to open invitations in which all contractors are welcome to submit bids. The purpose is of course to enhance

competition and transparency. The drawback is that it hampers long-term development in lasting relationships since actor constellations are changed in every project. Private sector clients on the other hand often utilize the possibility of inviting a limited number of trustworthy contractors, or even negotiate directly with one selected contractor.

2.2.4.3 Client Team 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; whether public or private, 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 experience (Chan and Kumaraswamy, 1997; Dissanayaka and Kumaraswamy, 1999).

2.2.4.4 Design Team Factors

The design team comprising architects, engineers and quantity surveyors play a vital role in the success of construction projects as their work commences from inception to completion therefore participating through the project life cycle. Chan and Kumaraswamy (1997) considered that design team-related factors consist of design team experience, project design complexity and mistakes or delays in producing design documents.

2.2.4.5 Construction Team Factors

The main contractor and subcontractors commence their main duties when the project reaches the construction stage. They have no input in the design and specification of materials. The contractor-related variables include contractor's experience, site management skills, supervision skills and involvement of subcontracting, contractor's cash flow, effectiveness of cost control system, and speed of information flow (Chan and Kumaraswamy, 1997; Dissanayaka and Kumaraswamy, 1999).

2.2.4.6 Project Manager Factors

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). Further 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.

2.2.4.7 Business and Work Environment Factors

Various researchers support the environment as a factor affecting the project success (Akinsola et al., 1997; Kaming et al., 1997; Chua et al., 1999; 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 advancement.

It is therefore observable that the list of factors that have a bearing on project success is endless and may differ from one project to another. The challenge therefore is to be able to identify the key success factors relevant to each type of project and the organisational structure in which the project is executed. A summary of the grouping of factors and the list of variables or attributes is shown in Table 2.1 below:

Table 2.1: Summary of Project Success Factors for Construction Projects

Category of Factors	Attributes/Variables	Author	Remarks
Project Management	Plan and schedule Communication Control Mechanisms Feedback capabilities Troubleshooting Coordination Decision making Monitoring and evaluation Organisation structure Management experience	Belout (1998) Chua et al. (1999)	Key to project success through use of project management tools to plan and execute projects.
Procurement	Procurement method Tendering method	Dissanayaka and Kumaraswamy (1999)	Important in contributing to project success.
Client Team	Client characteristics Client type and experience Knowledge in construction Project financing Confidence in team Scope Client's risk aversion	Chan and Kumaraswamy (1997) Dissanayaka and Kumaraswamy (1999).	The influence of client and client's representative is a significant factor especially on construction time performance.
Design Team	Design team experience Project design complexity Mistakes/delays in production of design documents.	Chan and Kumaraswamy (1997).	The design team comprising architects, engineers and quantity surveyors play a vital role in the success of construction projects. Their work runs through the project life cycle.
Construction Team	Contractor experience Site management Supervision Subcontracting, Contractor's cash flow Cost control system Information flow	Dissanayaka and Kumaraswamy (1999) Chan and Kumaraswamy (1997)	The main contractor and subcontractors start their main duties when the project reaches the construction stage.
Project Manager	The skills Character Commitment Competence Experience Authority	Chua et al. (1999) Belassi and Tukel (1996) Hassan (1995)	The project manager is a key stakeholder in a construction project.
Business / Work Environment	Economic environment Social environment Political environment Physical environment Legal environment Industrial relation environment Technology	Akinsola et al. (1997) Kaming et al. (1997) Chua et al. (1999)	External influences on the construction process.

Source: (Author, 2012)

2.3 Empirical Review

We now review literature based on observations or experiments using quantitative research methods to focus on critical success factors and performance of construction projects.

2.3.1 Critical Success Factors

As the factors having a bearing on the success are numerous and differs from one project to another, it is important to identify the critical factors for each project in its setting. Certain factors are more critical to project success than others. These factors are called critical success factors (CSFs). Mbugua et al. (1999) have defined CSFs as the few; typically four or five issues fundamental to the achievement of a particular strategic objective. The term 'critical success factors,' in the context of projects and the management of projects, was first used by Rockart (1982) and is defined as those factors predicting success on projects (Sanvido et al., 1992).

Several studies have been conducted on CSFs. According to Crawford (2000), the work of Murphy, Baker and Fisher (1974), using a sample of 650 completed aerospace, construction and other projects with data provided primarily by project managers, remains the most extensive and authoritative research on the factors contributing to project success. Ten factors were found to be strongly linearly related to both perceived success and perceived failure of projects, while twenty three project management characteristics were identified as being necessary but not sufficient conditions for perceived success (Baker et al., 1988).

Important work was also conducted on project success factors by Pinto and Slevin (1987, 1988) and Morris and Hough (1993). Both studies draw on the research of Murphy et al. (1974). While Morris and Hough (1993) drew primarily on literature and case study analysis of major projects, Pinto and Slevin (1987, 1988) based their findings on the opinions of a usable sample of 418 Project Management Institute (PMI) members responding to questions asking them to rate the relevance to project implementation success of ten critical success factors (Slevin and Pinto1986) and four additional external factors.

Further studies aimed at identifying factors contributing to the success of projects (Ashley et al., 1987; Lechler, 1998; Whittaker, 1999) used methodologies similar to that of Slevin and Pinto (1986), with findings based on ratings or in some cases rankings of success factors by project personnel, project managers or other professionals. Beale and Freeman (1991) identified fourteen variables that affect project success from a review of twenty nine papers.

Finally Tabish and Jha (2011) in an extensive literature review identified 36 success factors which were then subjected to the views of construction professionals on the criticality of these factors for the success of public construction projects. The responses from 105 professionals with an average of 22 years of experience in public construction projects were collected and analysed. The most important factors for success for various success criteria were classified as generic and specific.

The success factors of generic nature were: owners need thoroughly understood and defined, a high degree of trust shared by project participants, timely and valuable decision from top management, availability of resources as planned throughout the project, top management's support, and regular monitoring and feedback by top management, whereas success factors of specific nature were: thorough understanding of scope on the part of project manager and contractor, comprehensive pre-tender site investigation, regular monitoring and feedback by owner, no bureaucratic interference, no social and political interference, clearly articulated scope of work, quality control and quality assurance activities, and adequate communication among all project participants.

Several researchers have grouped the identified success factors. For example Belassi and Tukel (1996) as mentioned earlier grouped the success factors as derived from literature and described the impact of these factors on project performance. In another study conducted by Abdulla and Ramly (2006), the researchers concluded that based on the categorization of the CSFs, it is interesting to note that the criticality is ranked as follows; human management, organization, process and contractual. They therefore stated that the construction industry is perceived to be a very technical oriented industry. The stakeholders especially the designers, project managers, specialists, professional consultants, supervisors, sub-professionals and even semi-skilled

labourers require special technical and professional trainings to be able to contribute successfully to the project being implemented.

Further, in yet another study conducted by Saqip et al. (2008) on construction projects in Pakistan, seventy seven factors were chosen and categorized into seven groups. A criticality score and a criticality index were used to identify the CSFs. From the list of seventy seven factors, the top ten CSFs in descending order of importance, were found to be; decision making effectiveness, project Manager's experience, contractor's cash flow, contractor's experience, timely decision by owner or owner's representative, site management, supervision, planning effort, prior project management experience and client's ability to make decision. Further the top five CSFs categories were found to be; contractor-related factors, project manager related factors, procurement related factors, design team-related factors, project management factors. The initial objectives of this research (Saqip et al., 2008) was to define the critical 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. The study therefore focuses on the CSFs and not on the measurement of project success, that is, the key performance indicators (KPIs). The researchers recommend a further study to focus on KPIs, so that the causal relationships between CSFs and KPIs can be identified.

2.4 Summary of Literature Review Findings

This section highlights a summary of the findings in the literature review, which as mentioned at the beginning of the chapter, sets the foundation of the study. The section will summarise the definition and criteria for project success. The project success factors will further be listed thus defining the dependent and the independent variables. Finally a conceptual framework will be proposed that will guide the conduct of the study.

2.4.1 Project Success and Project Success Criteria

From the literature review, it has come out clearly that project success is a matter of perception by the different stakeholders involved in the specific project. A classic example of different

perspective of successful project according to Thomsett (2002) is the Sydney Opera House project in Australia which went sixteen times over the budget and took four times more to finish than originally planned. However, the final impact that the Opera House created was so big that no one remembers the original missed goals. The project was a big success for the external stakeholders and at the same time a big failure from the project management perspective. Cammack (2005) on the other hand indicates that, the Millennium Dome in London was a project on time and on budget but in the eyes of the British people was considered a failure because it did not deliver the awe and glamour that it was supposed to generate.

Nevertheless, it is possible to determine the criteria for project success. The traditional success criteria have always been delivery on time, on budget and to specification. From the review, these have been observed to be short term and more relevant to the project management process. They only offer a measure of efficiency during the implementation phase of the project and not effectiveness at completion. A project may meet all the three criteria as described above and fail to meet the expectations of the customers or target group.

For the purpose of this study, the researcher has identified the following project success criteria: delivery on time, on budget and to specification and appreciation by the customers. Other notable project success criteria for construction projects which will not be studied further are, to satisfy the project and or corporate objectives and environmental sustainability. Project success is therefore the sum of project management success and the product success. The researcher therefore concurs with Duncan (2004) that in the same way that quality requires both conformance to the specifications and fitness for use, project success requires a combination of product success (service, result, or outcome) and project management success.

2.4.2 Factors Affecting Construction Project Success

Construction projects have specific properties and additional constraints in terms of specifications, project duration and processes (Drewer, 2001). Being dynamic, the construction industry includes a wide variety of stakeholders, developed procurement system and not always customized product as an outcome of project. According to Toor, Ogunlana (2008) these aspects

make it distinct from other industries and to a certain extent incomparable to them. Regarding this sort of uniqueness attributable to construction projects it seems likely that specific success factors should drive these projects to success.

The review further revealed a long list of factors that affect the delivery of successful projects. For the purpose of this study, the researcher has proposed to adopt the classification of theses factor into seven distinct groups according to which element they relate to. The distinct groups proposed are; project management factors, procurement factors, client team factors, design team factors, construction team factors, project manager factors and external environment factors. These are the independent variables for this research project.

2.5 Research Gaps

In a research carried out by Poon, Potts and Cooper (2001) on 'Identification of success factors in the construction process' they stated that the identification of the success factors was considered from a theoretical point of view. They therefore suggested an area for future research is to undertake empirical studies on the factors in order to identify their relative importance. The suggested method would be through a questionnaire approach asking construction participants to identify and rank the success factors. Furthermore, it is suggested a mathematical model should be developed ranking the success factors of the construction process under different headings in a hierarchical manner. Odeyinka and Yusif (1997) undertook a study addressing the causes of delays in building projects in Nigeria. They classified the causes of delay as project participants and extraneous factors. Client-related delays included variation in orders, slow decision-making and cash flow problems. Contractor-related delays identified were listed as financial difficulties, material management problems, planning and scheduling problems, inadequate site inspection, equipment management problems and shortage of manpower. Further, the extraneous causes of delay identified were listed as inclement weather, acts of nature, labour disputes and strikes. This study focused on the time criterion only.

In a study carried out by Sambasivan and Soon (2007) on construction projects in Malaysia to identify factors affecting the time criterion of project success a questionnaire survey was

conducted to solicit response from clients, consultants and contractors. About 150 respondents participated in the survey. The study identified 10 most important causes of delay from a list of 28 different factors. The ten most important causes were listed as contractor's improper planning, contractor's poor site management, inadequate contractor experience, inadequate client's finance and payments for completed work, problems with subcontractors, shortage in material, labour supply, equipment availability and failure, lack of communication between parties and mistakes during the construction stage. This study developed a list of factors and did not attempt to group or relate the factors. In their conclusion the researcher recommended that academicians can conduct similar studies in other parts of the world and identify causes and effects of delays since some causes and effects may be unique to certain countries.

Al-Tmeemy et al. (2010) carrying out a study on future criteria for success of building projects in Malaysia found thirteen success criteria to be significantly and substantially related to building projects success based on the available literature. They invited 151 participants, who are involved in building construction through a postal and e-mails survey to generate priorities of these criteria. The results of this study indicated that a categorization scheme for success criteria for building projects should include first the categories of project management success (PMS); which is concerned with achieving management targets in terms of completing within the contracted period and allotted budget as well as conformance to the requirements. The second dimension is product success (PrS); that relates to the end product's (building's) targets in terms of functionality and fulfilling the technical requirements, as well as customer satisfaction. While the third dimension is market success (MrS), which relates to the project's potential in contributing to organization's success in the long term in terms of gaining a competitive advantages; enhancing organization's reputation; increasing the market share; and reaching specified revenue and profits or benefits. This particular study focused on the success criteria and the development of a framework.

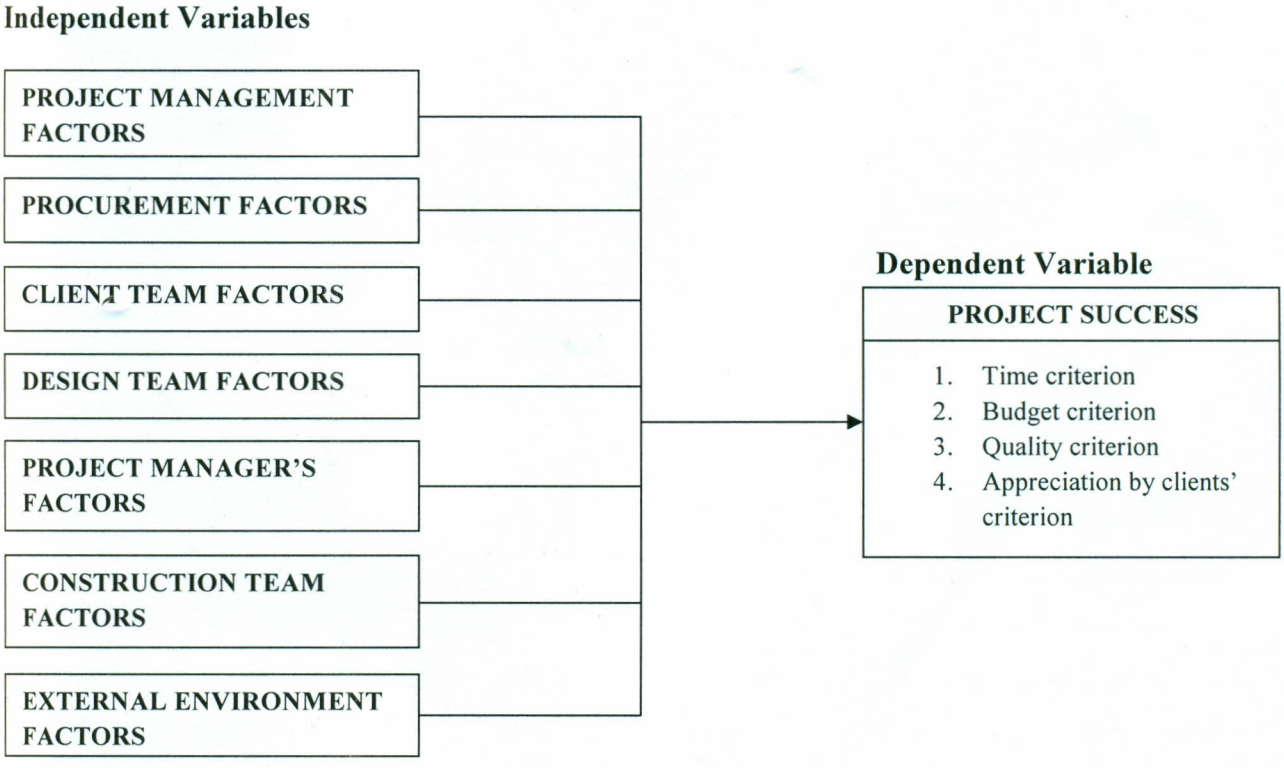
Further, in the study conducted by Saqip et al. (2008) on construction projects in Pakistan they concluded their work by recommending a further study on the relationship between CSFs and key performance indicators (KPI). They affirm that once this relationship is identified, it will be a useful piece of information to implement projects successfully. The information can help in

selecting project team members, identifying the development needs of the team members, and most important, for forecasting the performance level of a construction project before commencement. The researcher therefore proposes to carry out a research on the identification of key factors affecting successful delivery of housing construction projects especially at the Ministry of Housing.

2.6 Conceptual Framework

Conceptual framework can be defined as a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Reinchel and Ramney, 1987) as cited in Kombo and Tromp (2006). It is a research tool that interlinks the research concepts and explains the possible connection between the independent variables and the dependent variable(s) graphically.

Fig. 2.1: Conceptual Framework Diagram



Source: (Author, 2012)

2.6.1 The Independent Variables

Seven groups of project success factors (variables) were identified. Each group has a list of variables which have been explained further in Section 2.2.4. These variables will be subjected to analysis to yield the critical success factors. The interrelationship between the critical success factors and the project success, measured against project success criteria will then be determined.

2.6.2 The Dependent Variable

The dependent variable in this study is project success which is measured against the criteria of delivery on time, on budget and specification. The project should also be appreciated and accepted by the customers. Other notable project success criteria for construction projects which have not been taken into consideration are; to satisfy the project and or corporate objectives and environmental sustainability.

CHAPTER THREE:

3.0 RESEARCH METHODOLOGY

3.1 Research Design

Research design is the logical sequence that links the empirical data to a study's initial research questions (Yin, 2003). According to Kombo and Tromp (2006), a design is used to structure the research, to show how all of the major parts of the research project work together to try to address the central research questions. The researcher adopted a descriptive survey design since the study aimed to collect information from respondents on their opinion on the key success factors affecting housing construction projects in the Ministry of Housing. This design was appropriate since it is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals (Orodho, 2005 as cited in Kombo and Tromp, 2006). Further, according to Kombo and Tromp (2006) a descriptive survey design is not only restricted to fact findings, but may often result in the formulation of important principles of knowledge and solutions to significant problems. Primary data for the study was collected through the use of questionnaires.

3.2 Target Population

The target population is the entire group of individuals, objects or items a researcher is interested in and wishes to draw conclusions from as a result of a study. According to Mugenda and Mugenda (1999), a population is an entire group with at least one observable characteristic in common. The current study focused on five projects undertaken by the Civil Servants Housing Scheme in the Ministry of Housing with a target population of 824 subjects. The population was segmented into four specialized groups of persons who had been involved in the construction project management process for the ministry in the past five years and the beneficiaries of the projects. The four groups making the target populations were identified as; first the project management team who were mainly officials from the ministry at senior management level;

secondly, the consultants' team comprising; architects, quantity surveyors, structural and civil engineers, mechanical engineers and electrical engineers and thirdly the construction team comprising the main contractors and subcontractors for specialized services. The fourth and last group was identified as the various civil servants who have benefited from the projects. The target population was represented in Table 3.1 below:

Table 3.1: Target Population

Project	Participants			Customers	Combined Population size
	Consultants	Contractors	Project manager	Population size	
Ngara Phase I	6	5	5	130	**146**
Ngara Phase II	6	5	-	526	**537**
Nyeri Road	6	5	-	40	**51**
Kilimani	6	5	-	50	**61**
Makueni Road	6	5	-	22	**33**
Total	**30**	**25**	**5**	**768**	**828**

Source: (Author, 2012)

3.3 Sampling Design and Procedure

According to Orodho and Kombo (2005), sampling design is a process of selecting a number of individuals or objects from a population such that the selected group contains elements representative of the characteristics found in the entire group. The researcher used a census of the entire target population for the participants since the universe was small. This entails collecting data from every member of the population. Indeed Kothari (2004) avers that when the universe is small there is no use resorting to a sample since all items are covered, no element of chance is left therefore the highest accuracy is likely to be obtained. However to save on time and other resources, simple random and stratified sampling was used to identify respondents from the beneficiaries of the projects. The sample design representing a total of 120 respondents was represented in Table 3.2 below:

Table 3.2: Sample Design

Project	Participants			Customers			Total
	Consultants	Contractors	Project manager	Pop. size	Sample size	% Pop.	
Ngara Phase I	6	5	5	130	15	11.5	**31**
Ngara Phase II	6	5	-	526	32	6.08	**41**
Nyeri Road	6	5	-	40	5	12.5	**16**
Kilimani	6	5	-	50	5	10.0	**16**
Makueni Road	6	5	-	22	3	13.6	**16**
Total	**30**	**25**	**5**		**60**		**120**

Source: (Author, 2012)

3.4 Data Collection Instruments and Procedure

A questionnaire survey is one of the most cost effective ways to involve a large number of people in the data collection process in order to achieve better results (McQueen and Knussen, 2002; Andi and Minato, 2003). The researcher therefore developed a questionnaire to facilitate primary data collection and to ensure consistency in the elements examined. Each item in the questionnaire was designed to address a specific objective or research question. To achieve the stated objectives, the questionnaire was designed to have both structured and matrix questions. The matrix questions were especially relevant in the identification of the factors since a checklist had already been established from an extensive literature review.

Since the respondents were well informed or experts in the construction sector a drop and pick method was used. The questionnaires were administered to them and they were given time to complete them on their own and picked later, in most cases within a week. The researcher obtained letters of introduction and authorisation from both the university and the ministry respectively. They were both attached to the questionnaires and delivered to respondents. A follow-up on all the respondents was made and out of the 120 questionnaires issued, 81 were collected back registering a response rate of at least 67.5% which is acceptable. During the process of collecting data, the respondents were assured of confidentiality and the researcher further ensured that only data related to the study was collected and used for academic purposes only.

3.5 Reliability and Validity of Instruments

According to Carlson et al. (2009), reliability refers to the consistency of a measure. A measure is said to have a high reliability if it produces consistent results under consistent conditions. Mugenda and Mugenda (1999) add that reliability is a measure of degree to which a research instrument yields results or data after repeated trials. A pilot study was carried out and the questionnaire was revised to omit Question 25 was omitted before administering the instrument to the respondents since it had multiplicity of responses.

On the other hand validity of an instrument is a measure of how well an instrument measures what it is supposed to measure. According to Kramer, Douglas and Vicky (2009), validity is dependent on the instrument measuring what it was designed to measure and not something else instead. Great care was taken to ensure that the data collected was validated by checking the questionnaire for accuracy and completeness.

3.6 Data Analysis and Presentation

The raw data was compiled, sorted, classified and coded into quantitative information. The data was then processed and analysed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics and factor analysis was used to analyse the data.

Factor analysis was used because it attempts to identify underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. It is also often used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of manifest variables. The matrix questions were the only data subjected to analysis due to time constraints. The information was then organized and presented using tables. Utmost care was taken to ensure that the integrity of the results is maintained.

CHAPTER FOUR

4.0 DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter deals with the analysis of the data gathered from the questionnaire survey and the presentation of the findings. The obtained raw data was coded, inputted and analysed with the aid of the Statistical Package for Social Sciences (SPSS) computer software. Three types of analysis were performed. First, a reliability test of the raw data was carried out to examine internal consistency of the instrument and especially the 5 point Likert scale. Secondly the relative importance of the 72 factors in the seven factor groupings and the responses from the project beneficiaries was explored. The third test carried out was factor analysis. This test was used to determine the underlying relationships among the variables. The principal component analysis for factor extraction was employed to categorize the factors into fewer numbers in each grouping. The response rate, general information of the respondents, project features and the results of all the variables were then presented.

4.2 Response Rate

As shown in Table 3.2, Chapter 3, a total of 120 questionnaires were sent out to the different groups of respondents. Eighty one questionnaires were returned as indicated in Table 4.1 below making a total response rate of 67.5%. This rate was achieved after several efforts were made in terms of personal contacts. The response rate from the project participants was much higher, 80% compared to the response from project beneficiaries, 55%. It was much more difficult to trace the project beneficiaries since a good number live outside Nairobi since the purchase of the houses was open to all civil servants irrespective of their town of residence. However, the response rate of 67.5% is acceptable since according to Mugenda and Mugenda (1999), a response rate of 50% is adequate for analysis and reporting, while a response rate of 60% is good.

Table 4.1: Response Rate

Project	Participants			Customers	Total	% Response
	Consultants	Contractors	Project manager			
Ngara Phase I	5	5	4	9	**23**	**74.2%**
Ngara Phase II	4	4	-	17	**25**	**61.0%**
Nyeri Road	5	4	-	3	**12**	**75.0%**
Kilimani	5	4	-	2	**11**	**68.8%**
Makueni Road	5	3	-	2	**10**	**62.5%**
Total	**24**	**20**	**4**	**33**	**81**	**67.5%**

Source: (Author, 2012)

4.2.1 Reliability of Research Instrument

The first test carried out was internal reliability of the research instrument and especially the 5-point Likert scale using the Cronbach alpha technique. According to Brown (2001), Cronbach's alpha provides an accurate estimate of internal consistency and indicates how well the items in the set are correlated to one another. The test yielded an alpha of .710. The internal consistency ranges between zero and one. Indeed Nunnally and Bernstein (1994), further state that a commonly accepted rules of thumb is that the scores above .70 are considered acceptable. The results of the computation are shown in Table 4.2 below.

Table 4.2: Reliability Test Results

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.710	.707	72

Source: (Author, 2012)

4.2.2 Ranking of Factors

The second test carried out for each of the 7 groups of variables was to analyse the importance of each variable based on the mean score as indicated by the respondents. The data produced the statistical means for the 72 factors ranging from (mean = 4.60 to mean = 3.20), which indicated that all respondents considered these factors important for housing construction projects success.

Further, in order to check whether the respondents ranked the 72 factors in a similar order, Kendall's coefficient of concordance was computed. According to Yang et al (2007), if the concordance coefficient is equal to one, it means that all the respondents ranked the factors identically; on the other hand, if the concordance coefficient is equal to zero it means that all the respondents ranked the factors totally differently. The Kendall's coefficient of concordance for ranking the 72 factors in Table 4.3 below was .279. This suggests that there was a general agreement among the respondents on ranking the 72 factors. The respondents shared similar values on the relative importance of these factors.

Table 4.3: Kendall's Coefficient of Concordance Test Results

Kendall's W[a]	.279
Chi-Square	950.395
df	71
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

Source: (Author, 2012)

4.2.3 Factor Analysis of the 7-Factor Groupings

The third test that was carried out was factor analysis. Factor analysis refers to a statistical technique that summarizes the relationships between original variables in terms of smaller set of derived variables called factors or components (Hardy and Bryman, 2004). According to Jugdev and Muller (2005), it was advisable to reduce the variables and measure them well, rather than have a large number and not address them properly.

The data was first assessed for its suitability to factor analysis application. The Kaiser-Meyer-Olkin Sampling Adequacy Test and Bartlett's Test of Sphericity were carried out. The Bartlett Test of Sphericity tests the null hypothesis that the original correlation matrix is an identity matrix. This test must therefore have significance values less than .05. The value of the Kaiser-

Meyer-Olkin (KMO) measure of sampling adequacy on the other hand is recommended to be greater than .5 or more data is necessary (Hair et al., 2005). The results of these tests showed that the data samples were appropriate for factor analysis in each of the 7 factor groupings except for procurement related factors. Factor analysis was therefore carried out for each of the factor grouping that met the criteria.

4.3 Respondents' General Information

Having confirmed the suitability of the data through the preliminary tests, the data was then analysed first on the respondents' general information which formed the first part of the Questionnaires. The data from both the participants and the beneficiaries was analysed to disclose the background information of the respondents. The questionnaires were therefore treated separately since the backgrounds of the project participants and the beneficiaries were quite different.

4.3.1 Project Participants Profile

The general characteristics of the project participant respondents revealed that the common professions in the housing construction industry were evenly distributed and ranging from 8 to ten (16.7% to 20.8%) except for others. They were quite experienced in their respective professions. All the respondents had over 6 years' experience and majority had over 10 years' experience (89.6%). However the majority of them (79.2%) had only been engaged on one project for the Ministry. Regarding their primary role in the projects, the majority of the respondents were subcontractors (20.8%) followed by architects (12.5%). Some professions, for example clerks of works were not represented in the survey, primarily because their role had ceased and it was not easy to trace them. The results are shown in Table 4.4 below.

Table 4.4: Characteristics of the Project Participants

Respondent Profile	Description	Frequency	Percent	Cumulative Percent
Primary Profession	Architect	8	16.7	16.7
	Quantity Surveyor	8	16.7	33.3
	Structural/Civil Engineer	9	18.8	52.1
	Mechanical Engineer	10	20.8	72.9
	Electrical Engineer	9	18.8	91.7
	Others	4	8.3	100.0
Years of Experience in Building Construction Projects	6 – 10 Years	5	10.4	10.4
	11 – 15 Years	15	31.3	41.7
	16 – 20 Years	22	45.8	87.5
	21 And Above Years	6	12.5	100.0
Number of Housing Construction Projects Participated in for the Ministry	1	38	79.2	79.2
	2	6	12.5	91.7
	5 And above	4	8.3	100.0
Primary Role in the Projects	Employer's Representative	1	2.1	2.1
	Project Manager	1	2.1	4.2
	Project officer	2	4.2	8.3
	Architect	6	12.5	20.8
	Quantity Surveyor	5	10.4	31.3
	Structural Engineer	5	10.4	41.7
	Mechanical Engineer	4	8.3	50.0
	Electrical Engineer	4	8.3	58.3
	Main Contractor	5	10.4	68.8
	Subcontractors	10	20.8	89.6
	Construction Manager	1	2.1	91.7
	Site Agent	4	8.3	100.0

Source: (Author, 2012)

4.3.2 Project Beneficiaries Profile

Table 4.5 below elicits information on the beneficiaries' profile. Majority of the respondents (51.5%) were from Ngara phase II. This project was on-going at the time of the survey and the respondents were readily available. Moreover the population for this segment of the respondents was also higher compared to the others projects. In terms of job groups, which is a reflection of the economic class levels in the civil service, the upper middle level represented by job group P and Q had a clear majority of allocations (60.6%). The age of the respondents ranged between 21 and over 55 years. However the age that benefitted most was between 35 and 54 years (81.8%). On the other hand, of those surveyed, the male gender had a majority allocation (66.7%). Lastly the expected number of occupants ranged between 2 and above 9 persons. The majority saw between 3 and 5 persons (63.6%).

Table 4.5: Characteristics of the Project Beneficiaries

Respondent Profile	Description	Frequency	Percent	Cumulative Percent
Housing Project (Estate)	Ngara Phase I	9	27.3	27.3
	Ngara Phase II	17	51.5	78.8
	Nyeri Road	3	9.1	87.9
	Kilimani	2	6.1	93.9
	Makueni Road	2	6.1	100.0
Job Group	M and N	7	21.2	21.2
	P and Q	20	60.6	81.8
	R and above	6	18.2	100.0
Gender	Male	22	66.7	66.7
	Female	11	33.3	100.0
Age Bracket	21 – 34 Years	4	12.1	12.1
	35 – 44 Years	13	39.4	51.5
	45 – 54 Years	14	42.4	93.9
	Over 55 Years	2	6.1	100.0
Number in Occupation	2 and Below	2	6.1	6.1
	3 – 5 Persons	21	63.6	69.7
	6 – 8 Persons	8	24.2	93.9
	9 and Above Persons	2	6.1	100.0

Source: (Author, 2012)

4.4 Project Features

The second stage of the analysis looked at the project features. This had been represented by the second parts of both the questionnaires. The objective was to compare the responses from both the participants and the beneficiaries.

4.4.1 Characteristics of Project Features

All the project participants recorded that none of the projects was completed in time or within budget. This was corroborated by the beneficiaries' response that none of the houses were completed on time. The reasons given for example were delay in submission of design details and late payments to the contractor. Indeed the beneficiaries were asked for additional payments to cover for the extra costs of completing the housing units. However on specification, all participants responded that the projects had been completed to specification and licensed by National Environment Management Authority (NEMA). Overall, all the customers surveyed recorded a high level of satisfaction (97.9%). The results of this analysis are shown in Table 4.6 below.

Table 4.6: Characteristics of Project Features

Profile	Description	Frequency	Percent	Cumulative Percent
Occupancy Status	No	25	75.8	75.8
	Yes	8	24.2	100.0
When the Housing Unit was allocated	Before Commencement of construction	1	3.0	3.0
	During Construction	29	87.9	90.9
	At Completion of construction	3	9.1	100.0
Completion on Schedule	Yes	0	0	0
	No	33	100.0	100.0
Customer Satisfaction	Very Dissatisfied	0	0	0
	Dissatisfied	0	0	0
	Neutral	1	2.1	2.1
	Satisfied	25	52.1	54.2
	Very Satisfied	22	45.8	100.0

Source: (Author, 2012)

4.4.2 Ranking Project Features

The second process was to rank the project features based on their mean score, as rated by the respondents. Table 4.7 below shows the results of ranking project features that contribute to housing construction project success. Clear and timely communication between providers and beneficiaries was rated very highly as important for the success of housing construction projects (mean = 4.5). Other highly ranked features were economy of maintenance, suitability of the site for family needs, space provision and adequate parking and playground for children. Communication after occupation was rated low, with a mean score of 3.5.

After the preliminary parts of the questionnaires, were analysed to determine the background of the respondents and the performance of the projects, the matrix questions which formed the bulk of the instruments were then examined to determine the opinion of the respondents on what factors determine the success of housing construction projects. The 7 groups of factors were therefore subjected to factor ranking and factor analysis.

Table 4.7: Ranking Project Features

Code	Variable Description	N	Mean	Std. Deviation
B1.5	Clear and timely communication between providers and beneficiaries is important for the success of housing construction projects	33	4.5152	.50752
B2.7	The materials used are economical to maintain	33	4.4848	.50752
B2.1	The site is suitable for my family needs	33	4.3939	.49620
B2.4	The size and spaces offered by the individual rooms are adequate	33	4.3333	.47871
B2.2	The site has adequate parking and playground for children	33	4.0909	.45851
B1.1	I received frequent communication on the status of my application	33	3.8182	.46466
B2.6	The materials used are of high quality	33	3.7879	.41515
B2.8	The design is pleasing to the eye	33	3.7576	.43519
B1.2	I received regular updates on the progress of the project during construction	33	3.7576	.43519
B2.3	The number and organization of rooms is adequate for my family needs	33	3.6970	.52944
B2.5	The workmanship is of high quality	33	3.6667	.47871
B1.4	My enquiries on the project are usually addressed promptly	33	3.5152	.50752
B1.3	I have continued to receive regular follow up information after occupancy	33	3.4848	.50752

Source: (Author, 2012)

4.5 Project Management Factors Analysis

The first factor group had 18 variables which were first subjected to ranking based on their mean values to determine their importance as observed by the project participants. Secondly the variables were subjected to factor analysis to identify a relatively small number of factor groupings.

4.5.1 Ranking of Project Management Factors

The 18 variables were analyzed using descriptive statistics and the data produced means for the 18 factors ranging from 3.45 to 4.40. The highest ranked factor was proper planning and scheduling while the lowest ranked was project scope/size. Other highly ranked factors scoring 4.0 mean score and above were, project monitoring and evaluation, prior project management

experience, effectiveness in coordination, implementing an effective communication system and risk identification and allocation. The results are shown in Table 4.8 below.

Table 4.8: Ranking of Project Management Factors

Code	Variable Description	Mean	Std. Deviation	Analysis N
C1.6	Proper planning and scheduling	4.3958	.60983	48
C1.9	Project monitoring and evaluation	4.3333	.59549	48
C1.14	Prior project management experience	4.3333	.63021	48
C1.7	Effectiveness in coordination	4.3125	.58913	48
C1.1	Implementing an effective communication system	4.0000	.74377	48
C1.15	Risk identification and allocation	4.0000	.61885	48
C1.2	Control mechanism in place	3.8333	.72445	48
C1.16	Formal dispute resolution process	3.8333	.63021	48
C1.8	Decision making effectiveness	3.7917	.65097	48
C1.13	Coordination and control of sub-contractors' work	3.7292	.64378	48
C1.12	Implementing an effective quality assurance system	3.6667	.66311	48
C1.11	Implementing an effective safety system	3.6042	.60983	48
C1.18	Clear project objectives	3.5833	.61310	48
C1.5	Troubleshooting	3.5625	.50133	48
C1.17	Motivation/Incentives	3.5417	.54415	48
C1.10	Developing an appropriate project organization structure (Reporting system)	3.5208	.50485	48
C1.4	Feedback capabilities	3.5000	.50529	48
C1.3	Project scope/size	3.4583	.58194	48

Source: (Author, 2012)

4.5.2 Factor Analysis for Project Management Factors

The parameters for factor analysis for this group of 18 factors having been met as indicated in Table 4.9 below, the analysis was then carried out. The process yielded 7 components initially extracted with eigenvalues greater than 1, accounting for 68.07% of the total variance in the 18 criteria. The seven components solution explained a sum of the variance with component 1 contributing 18.90%, component 2 contributing 12.01%, component 3 contributing 9.59%, component 4 contributing 7.96%, component 5 contributing 7.76%, component 6 contributing 6.18%, and component 7 contributing 5.67%.

Table 4.9: KMO and Bartlett's Test for Project Management Factors

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.551
Bartlett's Test of Sphericity	Approx. Chi-Square	207.399
	df	153
	Sig.	.002

Source: (Author, 2012)

A further analysis based on varimax rotation of principal component produced a 7 component solution. Each of the 18 factors belonged to only one of the components with the value of factor loading exceeding or close to .5. The summary of these results is shown in Table 4.10 below.

Table 4.10: Factor Analysis Summary Results for Project Management Factors

Components	Eigenvalue	% of Variance	Name of Components	Mean Score	Factors	Factor Loading
1	3.40	18.9	Monitoring and Evaluation	3.52	C1.10	.789
				3.67	C1.12	.782
				4.33	C1.9	.777
2	2.16	12.01	Decision Making Effectiveness	3.79	C1.8	.776
				3.60	C1.11	.721
				3.50	C1.4	.645
				3.83	C1.2	.539
3	1.73	9.59	Communication Framework	3.46	C1.3	-.719
				4.00	C1.1	.675
				4.31	C1.7	-.657
				3.83	C1.16	.547
4	1.43	7.96	Motivation	3.54	C1.17	.812
5	1.40	7.76	Technical and Human Skills	3.56	C1.5	.789
				4.40	C1.6	.623
6	1.11	6.18	Risk Management	4.00	C1.15	.834
				4.33	C1.14	.581
7	1.02	5.67	Focus on Project Objectives	3.58	C1.18	-.699
				3.73	C1.13	.447

Source: (Author, 2012)

Component 1: Monitoring and Evaluation

This component accounted for 18.90% of the total variances. The factors loaded to it were; 'developing an appropriate project organisation structure' (sig. = .789), implementing an effective quality assurance system' (sig. = .782) and 'project monitoring and evaluation' (sig. = .777). All the three variables loaded to this component are important in contributing to project

success as observed from their mean score. Monitoring and evaluation as a factor had the highest mean score under this component. The other two are a measure of setting up a monitoring and evaluation framework. This component was further considered critical since it has one variable with a mean score above 4.00.

Component 2: Decision Making Effectiveness

This was the second most important component accounting for 12.01% of the total variances. The component had four variables loaded to it as follows; 'decision making effectiveness' (sig. = .776), 'implementing an effective safety system' (sig. = .721), 'feedback capabilities' (sig. = .645) and control mechanism in place (sig. = .539). The four variables in this component scored a mean average, but have reflected their importance in influencing construction project success by contributing to the second most important component in this group of factors.

Component 3: Communication Framework

The third component similarly had four variables loaded to it. These were 'project scope/size' (sig. = -.719), 'implementing an effective communications system' (sig. = .675), 'effectiveness in coordination' (sig. = -.657) and 'formal dispute resolution' (sig. = .547). These four variables recorded high mean scores except, project scope, thus signifying their importance in project success. The Project scope/size determines the complexity of the communication system to be put in place, thus relate with the other variables. This component had two variables with mean score above 4.00 and was considered critical.

Component 4: Motivation

Component 4 only had one factor loaded to it. This was 'motivation/incentives' (sig. = .812). Although this variable did not feature prominently in the means score, it stands out quite significantly as an important factor in project success. The benefits to the participants are as important as the end product to the beneficiaries.

Component 5: Technical and Human Skills

The fifth component had two variables loaded to it. These were; 'technical capability of project manager' (sig. = .789) and 'project manager's leadership skills' (sig. = .623). The project

manager's leadership skills had a high mean score (4.40), while technical capability of the project manager had a lower mean score (3.56). The component combines the technical and human skills requirement for the success of the project. Leadership is exhibited through human skills. One of the variables in this group had a mean score above 4.00, thus the component is considered critical.

Component 6: Risk Management

The sixth component also had two factors loaded to it, namely; 'prior project management experience' (sig. = .834) and 'risk identification and allocation' (sig. = .581). The two variables had high mean scores, indicating their very importance in contributing to project success. This principal component is significant in appraising project risk management. Prior project management is important in risk identification and allocation, therefore the close relationship. Both the variables in this component had mean scores above 4.00 and the component was therefore listed as a critical factor in construction project success.

Component 7: Focus on Objectives

Finally the last component too had two factors loaded to it as follows; 'clear project objectives' (sig. = -.699) and 'coordination and control of subcontractors' work' (sig. = .447). These last two variables had average mean scores, but are never the less important in project success. The variables are a measure of focus on project objectives. To achieve this, the work of subcontractors must be controlled by the project manager or the main contractor.

4.6 Project Manager's Factor Analysis

There were 15 variables in this group of factors. They were subjected to the factor ranking and factor analysis and the results are presented in the following sections.

4.6.1 Ranking of Project Manager Factors

The 15 variables were ranked based on their mean score as rated by the respondents and the results are shown in Table 4.11 below. The results ranged between 3.56 being the lowest and

4.48 being the highest. The top 4 highest factors with mean scores above 4.00 were; project manager's authority to make day to day decisions, project manager's authority to make financial decisions and select key team members construction control meetings and project manager's commitment to meet quality cost and time. The lowest ranked factor was motivating skills of the project manager.

Table 4.11: Ranking of Project Manager Factors

Code	Variable Description	Mean	Std. Deviation	Analysis N
C2.3	Project Manager's authority to make day-to-day decisions	4.4792	.54537	48
C2.4	Project Manager's authority to make financial decision, selecting key team members, etc.	4.4167	.57735	48
C2.15	Construction control meetings (site meetings)	4.3750	.67240	48
C2.11	Project manager's commitment to meet quality, cost and time	4.2917	.65097	48
C2.1	Project Manager's competence	3.8958	.59213	48
C2.2	Project Manager's experience	3.7917	.61742	48
C2.5	Technical capability of project manager	3.7708	.55504	48
C2.8	Coordinating ability and rapport of project manager with contractors/ subcontractors	3.7500	.56493	48
C2.14	Coordinating ability and rapport of project manager with owner/ owner representatives	3.7500	.48378	48
C2.12	Project manager's early & continued involvement in project	3.6875	.51183	48
C2.13	Project manager's adaptability to changes in project plan	3.6458	.56454	48
C2.6	Project manager's leadership skills	3.6250	.48925	48
C2.7	Organizing skills of project manager	3.6250	.56962	48
C2.9	Project manager's ability to delegate authority	3.6042	.49420	48
C2.10	Motivating skills of project manager	3.5625	.50133	48

Source: (Author, 2012)

4.6.2 Factor Analysis of Project Manager Factors

The data under this group of factors met the threshold for factor analysis as shown in Table 4.12 below.

Table 4.12: KMO and Bartlett's Test for Project Manager Factors

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.526
Bartlett's Test of Sphericity	Approx. Chi-Square	144.328
	df	105
	Sig.	.007

Source: (Author, 2012)

After the analysis of this grouping of factors, 6 components were extracted with eigenvalues greater than one, and accounted for 66.6% of the total variances. Component 1 contributed 19.13%, component 2, 12.77%; component 3, 10.08%; component 4, 8.74%; component 5, 8.23% and component 6, 7.65%. Each of the 15 factors belonged to only one of the components with the value of factor loading exceeding or close to .50. A summary of the results is represented in Table 4.13 below.

Table 4.13: Factor Analysis Summary Results for Project Manager's Factors

Components	Eigen value	% of Variance	Name of Components	Mean Score	Factors	Factor Loading
1	2.87	19.13	Team coordination	3.60	C2.9	.807
				3.75	C2.14	.671
				4.29	C2.11	.549
				3.75	C2.8	-.513
2	1.92	12.77	Organization	3.56	C2.10	.874
				3.63	C2.7	.582
3	1.51	10.08	Competence	3.79	C2.2	.719
				3.90	C2.1	.628
				3.69	C2.12	.554
4	1.31	8.74	Leadership	4.38	C2.15	.821
				3.63	C2.6	.525
5	1.24	8.23	Sensitive to change	4.42	C2.4	.675
				3.65	C2.13	-.665
6	1.15	7.65	Technical Capacity	3.77	C2.5	.858
				4.48	C2.3	.440

Source: (Author, 2012)

Component 1: Team Coordination

Four factors were loaded to this component which accounted for 19.13% of the total variances. These were; 'coordinating ability and rapport of the project manager with owner' (sig. = .807), 'project manager's ability to delegate authority' (sig. = .671), project manager's commitment to

meet quality, cost and time' (sig. = .549) and 'coordinating ability and rapport of project manager with contractors and subcontractors' (sig. = -.513). All these factors are important based on their mean values (between 3.6 and 4.29). They are suitable for measuring the project manager's ability to delegate and coordinate a team of project participants towards achieving success. The component was identified as critical to project success since it had one variable with a mean score above 4.00.

Component 2: Organization

Under this component which accounted for 12.77% of the total variance, two factors were loaded as follows; 'motivating skills of project manager' (sig. = .874) and organizing skills of project manager' (sig. = .582). They are all important factors as indicated by the mean scores. The factors can be an indicator for the project manager's skills in organizing and motivating the members of the project team as the team leader. His ability to organize and motivate the members of his team will contribute towards the success of the project.

Component 3: Competence

The third component which accounted for 10.08% of the total variances had three factors loaded to it. These were; 'project manager's experience' (sig. = .719), 'project manager's competence' (sig. = .628) and 'project manager's early involvement in the project' (sig. = .554). The factors were rated as important based on their mean scores and are indicators of the project manager's competence, experience and early involvement in the project. His competence, experience and early involvement in the project will enable him to understand the project better, thus deliver a successful result.

Component 4: Leadership

Two factors were loaded to this component as follows; 'construction control meetings' (sig. = .821) and project manager's leadership skills' (sig. = .525). Construction control meetings were found to be very critical in the success of projects based on the mean score of 4.38. This component measures leadership through constant interactions with the participants for clear directions, thus the importance of the meetings. The component was identified as critical to project success since it had one variable with a mean score above 4.00.

Component 5: Sensitivity to Change

This component also had two factors loaded to it. These were as follows; 'project manager's authority to make financial decisions' (sig. = .675) and 'project manager's adaptability to changes in project plan' (sig. = -.665). Authority to make financial decisions and selecting key team members was a very critical factor as indicated by a mean score of 4.42. The component is an indicator of the adaptability of the project manager to change in the project plan. This comes with the freedom to make key resource decisions or project inputs that are critical to the success of the project, especially human resource and financial recourse. This component also made it to the critical list due to one variable scoring a mean above 4.00.

Component 6: Technical Capacity

The last component in this group of factors also had two factors loaded to it as follows; 'technical capability of project manager' (sig. = .858) and project manager's authority to make day-to-day decisions' (sig. = .440). Again the factors under this component are very important for the success of the project (mean between 3.77 and 4.48). The component measures the project manager's ability to make day to day decisions. This requires a technical capacity to enable the project manager make the relevant decisions with minimum consultations. The technical capacity is considered critical factor since one of the variables had a mean score above 4.00.

4.7 Design Team Factor Analysis

The variables in the group of design team factors were only 5 and were analysed for both the factor ranking and factor analysis. The next sections present the results of the analysis.

4.7.1 Ranking Design Team Factors

Table 4.14 below shows the ranking of design team factors. The 5 factors produced a mean score ranging between 3.58 and 4.40. The highest ranked factor was mistakes/delays in producing design documents while the lowest ranked factor was adequacy of plans and specifications. One other factor with a high mean score above 4.00 was design team qualification and experience.

Table 4.14: Ranking of Design Team Factors

Code	Variable Description	Mean	Std. Deviation	Analysis N
C4.3	Mistakes/ delays in producing design documents	4.3958	.53553	48
C4.1	Design team qualification and experience	4.2500	.60142	48
C4.4	Team leaders coordination ability	3.6458	.60105	48
C4.2	Project design complexity	3.6042	.49420	48
C4.5	Adequacy of plans and specifications	3.5833	.53924	48

Source: (Author, 2012)

4.7.2 Design Team Factor Analysis

Table 4.15 below indicates that the preliminary tests for factor analysis of this group of factors met the threshold for analysis.

Table 4.15: KMO and Bartlett's Test for Design Team Factors

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.507
Bartlett's Test of Sphericity	Approx. Chi-Square	49.447
	df	10
	Sig.	.000

Source: (Author, 2012)

The analysis of this group of factors produced only two components after extraction with eigenvalues greater than one, and accounted for 64.04% of the total variances. Once again each of the five factors belonged to only one of the components, with the value of factor loading exceeding .5. The first component contributed 42.71% of the variances while the second component contributed 21.33%. The results are summarized in Table 4.16 below.

Table 4.16: Factor Analysis Summary Results for Design Team Factors

Components	Eigenvalue	% of Variance	Name of Components	Mean Score	Factors	Factor Loading
1	2.14	42.71	Consultants' Competence	4.40	C4.3	.825
				3.65	C4.4	.762
				3.60	C4.2	-.728
				4.25	C4.1	-.578
2	1.67	21.33	Design Product	3.58	C4.5	.970

Source: (Author, 2012)

Component 1: Consultants' Competence

Four of the five factors were loaded to this component. These were; 'mistakes/delays in producing design documents' (sig. = .825), 'team leader's coordination ability' (sig. = .762), 'project design complexity' (sig. = -.728) and design team qualification and experience' (sig. = -.578). The five factors loaded to this component were ranked as very important as indicated by their mean scores. The factors are a measure of consultants' competence and are critical to the successful delivery of housing construction projects. This component was identified as critical.

Component 2: Design Product

The second component had only one factor loaded to it. This was 'adequacy of plans and specifications' (sig. = .970). This factor is reasonably important based on the mean score of 3.58. The quality and completeness of design is critical in the success of housing construction projects.

4.8 Client Team Factor Analysis

This group had 14 variables and were subjected to factor analysis and factor ranking to determine their importance in project success.

4.8.1 Ranking Client Team Factors

The ranking of the 14 variables as shown in Table 4.17 below; produced mean scores ranging between 3.69 and 4.52. The highest ranked factor was the employer's ability to honour contractors' certificates. While the lowest ranked was employer's ability to brief the stakeholders. Three factors had a mean score greater than 4.00. These were employer's ability to honour contractor's certificates on time, employer's emphasis on low construction cost and employer's emphasis on quick construction.

Table 4.17: Ranking Client Team Factors

Code	Variable Description	Mean	Std. Deviation	Analysis N
C5.14	Employer's ability to honour contractor's certificates on time	4.5208	.50485	48
C5.7	Employer's emphasis on low construction cost	4.3542	.48332	48
C5.9	Employer's emphasis on quick construction	4.1667	.42941	48
C5.5	Employer's/Representatives' timely decision	3.9583	.54415	48
C5.4	Employer's clear and precise definition of project scope & objectives	3.8958	.55504	48
C5.13	Employer's ability to define roles	3.8750	.44363	48
C5.8	Employer's emphasis on high quality of construction	3.8333	.37662	48
C5.1	Influence of Employer/ Employer's representative	3.8125	.39444	48
C5.2	Employer's knowledge and experience of construction project organization	3.8125	.39444	48
C5.10	Employer's project management experience	3.7708	.51528	48
C5.6	Employer's risk attitude (willingness to take risk)	3.7500	.48378	48
C5.12	Employer's ability to make decision	3.7083	.45934	48
C5.3	Employer's confidence in construction team	3.6875	.46842	48
C5.11	Employer's ability to brief the stakeholders	3.6875	.51183	48

Source: (Author, 2012)

4.8.2 Factor Analysis of Client Team Factors

The parameters for factor analysis were met as shown in Table 4.18 below and the fourteen factors were subjected to factor analysis.

Table 4.18: KMO and Bartlett's Test for Client Team Factors

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.539
Bartlett's Test of Sphericity	Approx. Chi-Square	120.535
	df	91
	Sig.	.021

Source: (Author, 2012)

The fourteen factors in this grouping were reduced to six principal components with eigenvalues greater than one and accounting for 68.61% of the total variances. Each of the 14 factors belonged to only one of the components with the value of factor loading exceeding or close to .5. The components contribution to the variances was as follows; component 1 contributed 17.50%, component 2, 15.23%, component 3, 10.36%, component 4, 9.43%, component 5, 8.71% and component 6 contributed, 7.38%. A summary of the results is shown on Table 4.19 below.

Component 1: Budgetary Considerations

The first component of this grouping had three factors loaded to it. These were; 'employer's emphasis on low construction costs' (sig. = .801), 'employer's risk attitude' (sig. = .689) and 'employer's ability to brief the stakeholders' (sig. = .498). All these variables are very important in contributing to successful construction project. They returned a high mean score. The three factors are indicators of budgetary considerations. Further, this factor was listed as critical. One of the variables has a mean rating above 4.00.

Component 2: Timeliness in Implementation

The second component had two factors loaded to it as follows; 'employer's confidence in construction team' (sig. = .759) and 'employer's emphasis on quick construction' (sig. = .600). These two variables represent timeliness in project implementation. This is reflected in the employer's confidence in the construction team to deliver. The variables also had high mean scores as observed by the respondents. The component was listed as critical.

Table 4.19: Factor Analysis Summary Results for Client Team Factors

Components	Eigenvalue	% of Variance	Name of Components	Mean Score	Factors	Factor Loading
1	2.45	17.50	Budgetary Considerations	4.35	C5.7	.801
				3.75	C5.6	.689
				3.69	C5.11	.498
2	2.13	15.23	Timeliness in Implementation	3.69	C5.3	.759
				4.17	C5.9	.600
3	1.45	10.36	Decision Making Capacity	3.71	C5.12	.794
				4.52	C5.14	.623
4	1.32	9.43	Construction Knowledge	3.81	C5.2	.807
5	1.22	8.71	Product Quality	3.77	C5.10	-.829
				3.96	C5.5	.571
				3.83	C5.8	.532
6	1.03	7.38	Role Definition	3.90	C5.4	.768
				3.81	C5.1	-.656
				3.88	C5.13	.441

Source: (Author, 2012)

Component 3: Decision Making Capacity

The factors loaded into this component were; 'employer's ability to make decisions' (sig. = .794) and employer's ability to honour contractor's certificates on time' (sig. = .623). Employer's ability to honour contractor's certificate on time as a variable returned a very high mean score therefore underscoring its importance as a factor contributing to housing construction success. This factor reflects the ability of the employer to make prompt decisions. This component was listed as critical.

Component 4: Construction Knowledge

The fourth component only had one factor; 'employer's knowledge and experience of construction project organisation' (sig. = .807). This factor had a high mean score, signifying its importance in contributing to project success.

Component 5: Product Quality

This component had three factors loaded to it as follows; 'employer's project management experience' (sig. = -.829), 'employer's/representative's timely decisions' (sig. = .571) and 'employer's emphasis on high quality of construction' (sig. = .532). The mean ratings indicated

that these variables are important as factors in project success. The combined factors are indicators of product quality as an outcome of project management experience.

Component 6: Role Definition

The last component of this group of factors also had three factors loaded to it as follows; 'employers clear and precise definition of project scope and objectives' (sig. = .768), 'influence of employer/employer's representative' (sig. = -.656) and employers ability to define roles' (sig. = .441). The mean scores for the three factors under this component were fairly high and close to one another. This reflected their importance as indicated by the respondents. Role definition, scope and objectives, and the employer's influence are all competing for prominence. The overriding factor then can be summarised as the employer's focus on scope and objectives and clear role definitions.

4.9 Construction Team Factors

The group of construction factors had 7 variables which were ranked and then subjected to factor analysis. The variables ranged from contractor's experience to speed of information flow and ability to coordinate the activities of the subcontractors.

4.9.1 Ranking Construction Team Factors

The 7 construction team variables when subjected to mean score ranking as perceived by the respondents yielded a mean score ranging between 3.63 and 4.60. Three factors had mean scores greater than 4.00. These were contractor's experience, Contractor's cash flow and site management. The lowest ranked factor was speed of information flow. The results are presented in Table 4.20 below.

Table 4.20: Ranking Construction Team Factors

Code	Variable Description	Mean	Std. Deviation	Analysis N
C6.1	Contractors experience	4.6042	.49420	48
C6.5	Contractor's cash flow	4.5833	.49822	48
C6.2	Site management	4.5000	.54578	48
C6.4	Ability to coordinate the activities of subcontractors	3.7917	.58194	48
C6.3	Supervision	3.7708	.62704	48
C6.6	Effectiveness of cost control system	3.7083	.54415	48
C6.7	Speed of information flow	3.6250	.53096	48

Source: (Author, 2012)

4.9.2 Construction Team Factor Analysis

Table 4.21 below indicates that the construction team factors met the criteria for factor analysis and the analysis was carried out on the seven factors.

Table 4.21: KMO and Bartlett's Test for Construction Team Factors

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.606
Bartlett's Test of Sphericity	Approx. Chi-Square	39.186
	df	21
	Sig.	.009

Source: (Author, 2012)

The factors in this group of variables were reduced to three principal components with eigenvalues greater than one and accounted for 63.85% of the total variances. Once again each of the 7 factors belonged to only one of the components, with the value of the factor loadings exceeding .5. The components contributed to the variances as follows; component 1 contributed 30.73%, component 2, 18.36% and component 3, 14.76%. The summary of these results is shown on Table 4.22 below.

Table 4.22: Factor Analysis Summary Results for Construction Team Factors

Components	Eigenvalue	% of Variance	Name of Components	Mean Score	Factors	Factor Loading
1	2.15	30.73	Coordination of Resource	3.79	C6.4	.830
				3.71	C6.6	.794
				4.58	C6.5	.485
2	1.29	18.36	Information Management	3.63	C6.7	.862
				3.77	C6.3	.695
3	1.03	14.76	Contractor's Knowledge Development	4.60	C6.1	.878
				4.50	C6.2	-.730

Source: (Author, 2012)

Component 1: Coordination of Resource

Three factors were loaded to this first factor as follows; 'ability to coordinate the activities of subcontractors' (sig. = .830), 'effectiveness of cost control system' (sig. = .794) and 'contractors cash flow' (sig. = .485). The three variables had high means scores. Contractor's cash flow was rated highest in this group, therefore signifying its importance in project success. The three factors are indicators of the contractor's ability to coordinate the project resources. The cash flow and the activities of the subcontractors are critical to realising a successful project. The component is therefore considered critical.

Component 2: Information Management

The second component had two factors loaded to it as follows; 'speed of information flow' (sig. = .862) and 'supervision' (sig. = .695). The mean score for these two factors was fairly high. Information flow is important is important and must be followed up to ensure compliance, resulting into supervision.

Component 3: Contractor's Knowledge Development

The last component also had two factors loaded to it. The factors were; 'contractors experience' (sig. = 878) and 'site management' (sig. = -.730). These two variables had very high mean scores. They are therefore very important as factors affecting project success. Experience and site management can be viewed as knowledge development by the contractor over time. The component was listed as a critical factor in project success as it had two variables with a mean score above 4.00.

4.10 External Environment Factor Analysis

There were 11 variables under the external environment factors group. The factors met the threshold for factor analysis and were ranked and taken through the analysis process.

4.10.1 Ranking External Environment Factors

After obtaining the means of the variables through descriptive statistics, the means were ranked in a descending order. The analysis produced mean scores ranging between 3.21 and 4.50. The group had the lowest ranked mean overall (3.21) amongst all the 72 variables. The highest ranked factor was adequate funding from external sources, for example the National Treasury. The other 2 factors that scored above 4.00 are economic environment and commitment of all parties to the project. Table 4.23 below presents the results of the analysis.

Table 4.23: Ranking External Environment Factors

Code	Variable Description	Mean	Std. Deviation	Analysis N
C7.8	Adequacy of funding from external sources, e.g. Treasury	4.5000	.50529	48
C7.1	Economic environment (price variations, inflation etc)	4.4167	.49822	48
C7.7	Commitment of all parties to the project	4.3542	.63546	48
C7.3	Political environment	3.7292	.53553	48
C7.9	Technology availability	3.7292	.53553	48
C7.2	Social environment (etc)	3.6875	.46842	48
C7.4	Physical work environment (site conditions, weather etc)	3.6042	.53553	48
C7.6	Administrative approvals environment (Local authority approvals, NEMA, etc.)	3.6042	.49420	48
C7.10	Human Skill availability	3.6042	.57388	48
C7.5	Industrial relations environment (Labour laws etc)	3.5208	.50485	48
C7.11	X-Factor (fraudulent practices, corruption, favouritism, lack of ethics, etc.)	3.2083	.58194	48

Source: (Author, 2012)

4.10.2 Factor Analysis for External Environment Factors

This group of factors was explored after meeting the criteria for factor analysis as indicated in Table 4.24 below.

Table 4.24: KMO and Bartlett's Test for External Environment Factors

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.528
Bartlett's Test of Sphericity	Approx. Chi-Square	82.705
	df	55
	Sig.	.009

Source: (Author, 2012)

The eleven factors in this group yielded 5 principal components initially extracted with eigenvalues greater than one and accounting for 70.35% of the total variance. Table 4.25 below represents the results of the analysis. Component 1 contributed 19.33%; component 2, 15.98%; component 3, 12.74%; component 4, 11.51% and component 5 contributed 10.80%.

Component 1: Socio-economic Environment

The first component had three factors loaded to it. These were; 'social environment' (sig. = .888), 'adequacy of funding from external sources' (sig. = .793) and 'economic environment' (sig. = .754). Under this component the three variables had very high mean scores except social environment. The other two variables significantly represent the economic environment. The factors significantly contribute to construction project success. This component was further considered critical to project success as it had two variables recording mean scores above 4.00.The component was considered critical to project success as it had one variable with a mean score above 4.00.

Component 2: Technological Development

The second component had two factors loaded to it as follows; 'x-factors' (sig. = .804) and 'technology availability' (sig. = .710). These two variables did not record high mean scores especially the x-factors. Technological availability however had a significant mean score indicating its relative importance in project success. The factors are indicative of technological development.

Table 4.25: Factor Analysis Summary Results for External Environment Factors

Components	Eigenvalue	% of Variance	Name of Components	Mean Score	Factors	Factor Loading
1	2.13	19.33	Socio-economic Environment	3.69	C7.2	.888
				4.50	C7.8	.793
				4.42	C7.1	.754
2	1.76	15.98	Technological Development	3.21	C7.11	.804
				3.73	C7.9	.710
3	1.40	12.74	Sustainable Environment	3.60	C7.6	.808
				3.60	C7.4	.803
4	1.27	11.51	Political Support	4.35	C7.7	.819
				3.73	C7.3	.726
5	1.19	10.80	Labour and Industrial Relations	3.52	C7.5	.743
				3.60	C7.10	.628

Source: (Author, 2012)

Component 3: Sustainable Environment

Two factors were loaded to this component. They were; 'administrative approvals' (sig. = .808) and 'physical work environment' (sig. = .803). The variables under this component returned a relatively high mean score. They are indicative of environmental sustainability as a factor of project success. The project should not be destructive to the physical environment.

Component 4: Political Support

Again two factors were loaded to this component. The factors were; 'commitment of all parties to the project' (sig. = .819) and 'political environment' (sig. = .726). Commitment of all parties to the project as a variable had a very high mean score. This was indicative of its importance to the construction project success. The factor is close to effects of political environment as it is representative of the internal politics of project implementation. The principal component is therefore indicative of political support both internally and externally.

Component 5: Labour and Industrial Relations

The last component too had two factors loaded to it. The factors were; 'industrial relations environment' (sig. = .743) and 'human skills availability' (sig. = .623). The two variables under this component had average mean scores. They represented the availability of human skills and industrial relations, thus summarised as labour and industrial relations.

4.11 Procurement Factors

Procurement related factors had only 2 variables. They were analysed to produce a factor ranking based on their mean scores. The variables however could not be subjected to factor analysis because they did not meet the criteria for the analysis as shown in Table 4.26 below. This initial test (KMO and Bartlett's Test) yielded a significance value greater than 0.05 (sig. = .315). For the factor analysis to be carried out the result must have significance values less than .05. The value of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy on the other hand is recommended to be greater than .5. In this case the result was just on the borderline.

Table 4.26: KMO and Bartlett's Test for Procurement Factors

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	1.008
	df	1
	Sig.	.315

Source: (Author, 2012)

4.11.1 Ranking Procurement Factors

Table 4.27 below presents the result of the ranking analysis. The mean score was not very significant compared to the other factors presented earlier.

Table 4.27: Ranking Procurement Related Factors

Code	Variable Description	Mean	Std. Deviation	Analysis N
C3.1	Project bidding method (e.g. price based competitive open bidding, restricted bidding)	3.5833	.61310	48
C3.2	Project contract mechanism (e.g. lump sum, unit price, cost plus, fluctuation, fixed price etc.)	3.4583	.74258	48

Source: (Author, 2012)

4.12 Overall Factor Ranking

The analysis of the data produced the statistical means for the 72 factors ranging from (mean = 3.20 to mean= 4.60), which indicated that all respondents considered these factors important for housing projects success. The results of the top 20 factors that scored above (mean = 4.00) are shown on Table 4.28 below (full list of the ranked factors is attached as Appendix 6). The highest ranking by all respondents was 'contractors experience' (mean = 4.60) while the lowest was x-factors (mean = 3.21). The mean score rankings above 4.50 are considered most important and critical to project success. Five factors were listed under this category, three of which were related to project financing. The other 2 were related to contractors experience and effective site management. Only one factor; 'x-factors' was found not to be so important in influencing the successful delivery of housing construction projects in the ministry. The rest of the 66 factors registered mean scores between 4.49 and 3.50 and are categorised as important in the successful delivery of housing construction projects in the ministry of Housing, Nairobi, Kenya.

Table 4.28: Ranking of the top 20 factors

Code	Description	Mean	Rank
C6.1	Contractors experience	4.6042	1
C6.5	Contractor's cash flow	4.5833	2
C5.14	Employer's ability to honour contractor's certificates on time	4.5208	3
C6.2	Site management	4.5000	4
C7.8	Adequacy of funding from external sources, e.g. Treasury	4.5000	4
C2.3	Project Manager's authority to make day-to-day decisions	4.4792	6
C2.4	Project Manager's authority to make financial decision, selecting key team members, etc.	4.4167	7
C7.1	Economic environment (price variations, inflation etc)	4.4167	7
C4.3	Mistakes/ delays in producing design documents	4.3958	9
C1.6	Proper planning and scheduling	4.3958	9
C2.15	Construction control meetings (site meetings)	4.3750	11
C7.7	Commitment of all parties to the project	4.3542	12
C5.7	Employer's emphasis on low construction cost	4.3542	12
C1.14	Prior project management experience	4.3333	14
C1.9	Project monitoring and evaluation	4.3333	14
C1.7	Effectiveness in coordination	4.3125	16
C2.11	Project manager's commitment to meet quality, cost and time	4.2917	17
C4.1	Design team qualification and experience	4.2500	18
C5.9	Employer's emphasis on quick construction	4.1667	19
C1.1	Implementing an effective communication system	4.0000	20
C1.15	Risk identification and allocation	4.0000	20

Mean scores: 1=Not important and 5=Most important

Source: (Author, 2012)

CHAPTER FIVE

5.0 SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This last chapter presents a summary of the findings, conclusions based on the analyses and recommendations. The chapter also looks back at the initial objectives of the study and examines to verify whether the objectives have been achieved. It further looks ahead to recommend areas for further studies.

5.2 Summary of Factor Analysis

This section focuses on the summary of the factor analysis results. Each of the results of the 7 factor groups will be summarised indicating the number of factors extracted and the critical factors resulting from the extraction. The factor analysis extracted 29 principal components from the initial 72 variables listed in the questionnaire for respondents. The summary of the results for each of the components are listed under each group of factors as follows:

Project Management Factors

Project management factors were reduced from 18 variables to 7 factors. Four of these factors were critical; featuring factors that had returned a mean scores greater than 4.0. These were, monitoring and evaluation, communication framework, technical and human skills availability and risk management.

Project Manager's Factors

This group of factors initially had 15 variables. From factor analysis 6 factors were extracted and 4 were critical as follows; team coordination, leadership and control, flexibility to plan changes and project manager's technical capacity.

Design Team Factors

The initial variables under this group were 5 and were reduced to 2 factors. All the new factors were listed as critical to the success of housing construction projects. These were the consultants' competence and the design product.

Client Team Factors

Client team factors initially had 13 variables from which 6 factors were extracted and 3 were listed as critical. These were; budgetary considerations, timeliness in implementation and decision making capacity. They had at least one variable in the top 20 list of variables with the highest mean score.

Construction Team Factors

Construction team factors initially had 7 variables. They were reduced to 3 factors after factor analysis and 2 were identified as critical. These were resource coordination and contractors knowledge development.

External Environment Factors

This last group of factors initially had 11 variables. They were reduced to 5 factors through the process of factor analysis and 2 factors were further identified as critical to project success. The critical success factors are socio-economic environment and political support.

5.3 Conclusions

The main contribution of this research is the identification, ranking and ordered group of factors that determine successful delivery of housing construction projects in the Ministry of Housing in Nairobi, Kenya. 72 factors were identified through the literature review. These factors formed the base on which the questionnaire survey was structured. From this survey the ranking of these factors was obtained. Using the factor analysis technique, the 72 factors initially grouped under 7 headings were reduced to 29 principal components under the initial headings. The procurement related factors group, however did not meet the threshold for factor analysis but their importance in the ranking was noted. All the 29 sub-groupings and their relationship under the reduced 6

headings were further studied and 16 critical factors were identified under their respective headings.

5.3.1 Project Management Factors

Initially 18 variables were identified in this group of factors. The ranking of these factors produced a mean score range of between 3.46 and 4.40. The highest ranked is proper planning and scheduling. The next highest ranked are a tie between prior project management experience and monitoring and evaluation. The other high ranked means (above 4.00) signifying importance in determining project success are; effectiveness in coordination, effective communication system and risk identification and allocation. These results were corroborated by Saqib et al (2008) who recorded planning effort as very important in a study assessing critical success factors in construction projects. Indeed planning leads this group of factors following by control. Both of these factors are recognized by many sources as the most relevant on the way to success. Communication seems to be a part of a whole chain: producing a plan, sharing goals via communication channels and control of execution. Decision making effectiveness remains averagely important factor in this group. This contradicts the findings of Belout (1998) and Yu et al. (2006) who emphasize an importance of this factor for overall project success. Further when the factors are reduced from the initial 18 to 7 through factor analysis, four of the derived factors then stand out as critical in determining project success. The derived names of the new factors based on their characteristics are; monitoring and evaluation, communication framework, technical and human skills availability and risk management.

5.3.2 Project Manager's Factors

This group of factors initially had 15 variables. The top ranked factor was project manager's competence, closely followed by project manager's experience. The other two factors with high scores can be summarised as the project manager's capacity to make decisions. The project manager being one of the key players of every project is very likely to influence project success. However according to Chua et al. (1999) experience of project manager might have the highest impact on project deliverables. This finding is further supported by Walker and Vines (2000) and

Belout (1998) who argue that effectiveness of decision making process is dependent on the project manager's experience. On the other hand decision making abilities might be considered as project managers soft skills which are developing depending on experience (Gardiner, 2005). From factor analysis 6 factors were extracted and 4 were critical as follows; team coordination, leadership and control, flexibility to plan changes and project manager's technical capacity.

5.3.3 Design Team Factors

The initial variables under this group were 5 and were reduced to 2 factors. Only one of the new factors was listed as critical to the success of housing construction projects. This was the consultants' competence. The design team qualification and experience, was the highest ranked mean score indicating that this is indeed a very important factor in determining the success of construction projects in this group of factors. Indeed this is confirmed by a study carried out by Saqib et al (2008) where both the design team experience and adequacy of plans and specification are rated as critical in determining project success.

5.3.4 Client Team Factors

This group of factors initially had 13 variables from which 6 factors were extracted and 3 were listed as critical. These were; budgetary considerations, timeliness in implementation and decision making capacity. They had at least one variable in the top 20 list of variables with the mean score above 4.00. On the rankings, three variables had mean values greater than 4.00. These were employer's ability to honour contractor's certificates on time, employer's emphasis on low construction cost and employer's emphasis on quick construction. This is confirmed by Walker (1995) who considered the influence of client and client's representative as a significant factor on construction time performance.

5.3.5 Construction Team Factors

The variables under this group of factors were initially 7 and were reduced to 3 through factor analysis. Of the 3 new groups of factors, 2 were considered critical. Further, this group

contributed three factors in the five top ranked factors overall, thus leading in the most critical success factor in determining success of construction projects. The top 5 factors were: contractors experience, contractor's cash-flow and site management by the main contractor under the construction team factors. The other two were employer's ability to honour contractor's certificates on time, under the client team factors and adequacy of funding from external sources under the external environment factors. Indeed this result is confirmed by Saqib et al (2008) in a related study carried out on construction projects in Pakistan. The high mean ranking of the contractors' competences might be a supporting argument to the general theory of increasing importance of human resources' soft skills in project success (Gardiner, 2005).

5.3.6 External Environment Factors

The external environment team factors initially had 11 variables. They were reduced to 5 factors through the process of factor analysis and 2 factors were further identified as critical to project success. The critical success factors are socio-economic environment and political support. Interrelation between political and economic environment characteristics has been broadly discussed in the literature (Johnson, et al., 2008). According to Chan et al. (2004), similar situation might be observed in other situations where project success is rather influenced by a group of external environment characteristics than a single parameter.

5.3.7 Procurement Team Factors

The ranking of procurement related factors appears low which seemed unexpected due to its significant role particularly in construction projects assigned by different authors (Kumaraswamy and Chan, 1999 and Fortune and White, 2006). However, to find a reason of the contradiction factors under this cluster may have to be analysed separately and in depth.

5.4 Recommendations

This research has produced detailed analyses of determinants of successful delivery of housing construction projects in the form of mean ranking of variables and factor reduction techniques in

order to unveil empirical findings with regards to the Ministry of Housing construction projects in Nairobi, Kenya. It is hoped however that the empirical findings of this study could offer an insight to the Government and project oriented public organizations in Kenya for future strategies and guidelines with regards to delivering successful construction projects for the development of the construction industry. From the analysis, the top 5 determinants were: contractors experience, contractor's cash-flow and site management by the main contractor under the construction team factors. The other two were employer's ability to honour contractor's certificates on time, under the client team factors and adequacy of funding from external source under the external environment factors. It should be noted that three of the top five factors are related to project funding, while the other two concerns the contractors' experience and effective site management. Funding is therefore a critical factor for public projects since there are many urgent and varied needs that compete for the scarce resource.

5.4.1 Project Management Factors

The project management group of factors had 6 factors ranked among the top 20 highly ranked factors. This is a revelation of the importance of this group of factors in the construction industry. Further, the factor analysis and the grouping of the reduced factors revealed that the critical determinants were; monitoring and evaluation, effective communication, technical and human skills and risk management. Project management as a discipline is therefore critical for the success of construction projects. Organizations undertaking these projects should therefore ensure that project management tools and techniques, like planning and scheduling, communication, risk identification and allocation and monitoring and evaluation are incorporated in their projects from inception to increase chances of success.

5.4.2 Project Manager's Factors

For the project manager's factors, the critical determinants are; team coordination, leadership, sensitivity to plan changes and the project manager's technical capacity. In the factor ranking, this group of factors had 4 factors of the initial 15 factors ranked in the top 20 most important

factors. It was clear that the project manager must be authorised to make day to day decisions and decisions affecting resource utilisations, both human and material. He must also be committed to meet the three key components of project success, that is quality, cost and time. The manager must also be capable of coordinating the project team and poses both leadership and technical knowledge relevant to the construction industry.

5.4.3 Design Team Factors

The design team factors on the other hand had only one critical determinant, namely; consultants' competence. The competence of consultants is usually assured by respective professional bodies through registration and Continuous Professional Development (CPD). The organisations carrying out projects should therefore ensure that the consultants they engage whether in-house or externally engaged are up to date with current trends in the construction industry. The consultant's data base should therefore be reviewed from time to time to ensure only those in learning organisations or consultancies are commissioned.

5.4.4 Client Team Factors

From factor analysis and factor ranking, the group of client team factors had three critical determinants as follows; budgetary considerations, timeliness in implementation and decision making capacity. The top on the list of ranking was the client's ability to honour the contractors' certificates on time. Indeed budgetary considerations feature prominently to determine timeliness in implementation. The organisation must therefore have a clear cash flow projection and a forward planning (budgetary) section throughout the life cycle of the project. All external funding should be confirmed and made available within the expected periods. Other projects should not be initiated to avoid resource competition.

5.4.5 Construction Team Factors

The construction team posted two critical determinants. These were coordination of resources and contractor's knowledge development. The contractor's experience and cash flow ranked very

high implying their importance. The experience of the contractor should not be based on the years in business, but the efficiency of their operations. The implementing organisations should therefore keep and update a database of high performing contractors from which they can procure future contractors. This recommendation is contrary to the laws regarding public procurement that restrict public sector clients' bid invitations to open invitations in which all contractors are welcome to submit bids. The database should therefore be instrumental during bid evaluations to select the performing contractors.

5.4.6 External Environment Factors

The external environment factors group had two critical determinants; socio-economic environment and political support. The factors in this group may be outside the influence of the implementing organisation, but they should take advantage of the prevailing conditions to maximise on the success of the projects. One of the projects, Ngara Phase 2 for example suffered a delay of over 7 months because it was awarded around the last elections and was affected by the post-election violence. The delay in commencement will definitely have a cost overrun.

5.4.7 Procurement Related Factors

The ranking of procurement related factors appears low which seemed unexpected. Procurement involves the process of selecting a capable contractor and is one of the most important tasks faced by clients who wish to achieve project success. It should be noted that laws regarding public procurement restrict public sector clients' bid invitations to open invitations in which all contractors are welcome to submit bids. The purpose is of course to enhance competition and transparency. The drawback is that it hampers long-term development in lasting relationships since actor constellations are changed in every project. The unexpected low ranking of its factors should be investigated in future studies.

5.5 Recommendations for Further Research

This section provides a brief overview of possibilities of improving the current study and carrying out research in different areas in order to add knowledge to the project management theory. To this end, two recommendations are made. First, the overview of existing literature identified a lack of research in the area of construction industry in Kenya. Therefore further study should be done considering different types of projects like research and development projects or civil engineering construction projects and comparing the results with the results of this study.

Secondly, the current research may be developed by increasing the sample size and studying the area more in depth by deploying different methodology. Increasing the sample size could help to identify more precisely the interrelation framework of success factors. In addition different research methodology like semi-structured interviews or case studies may be carried out in a sufficient number of organisations to be statistically eligible to generalize to industry level. This can provide a significant contribution to the existing literature by adding knowledge to the project management theory in a developing economy like Kenya.

5.6 Research Limitations

This section highlights the drawbacks of the current study and specifies to which extend it might be applicable in project management knowledge area. Two main drivers of this research are scope of study and methodology applied. Four areas were identified and are briefly highlighted. First and foremost since this study was focused on a specific type of project in one country, and a limited location within one organisation, the research is not able to provide generalization regarding the construction industry as a whole. This may be the main limitation of this study since the conclusions cannot be applied to other organisations. This limitation can be addressed by conducting further research in this area as recommended in Section 5.5 above.

Secondly, as the results in this research were based on a questionnaire survey, the respondents may have had different understandings of the statements or questions posed to them, and this may have a bias in the scoring of the factors. The findings in this research should therefore be further validated by case studies or the target population be expanded. In addition, since the

questionnaire survey was conducted based on the projects within the Ministry of Housing located in Nairobi, the findings may not be generalized to other geographical locations or projects of different types as has already been indicated.

The third limitation observed was as a result of sample representation. This was addressed by distributing the questionnaire to a wide range of the relevant professions that participated in the projects. However this sample cannot be representative of the housing construction industry in Kenya. It should be noted that, samples cannot precisely describe all the features of an entire population. Besides, there is always a probability of receiving 'uninformed response', which are questionnaires filled in not by the target respondents but by their assistants in the organisation who may not be competent in the area of study.

Lastly the current research has employed different tools and techniques of descriptive statistics as well as factor analysis to study interrelationship between the different success factors. These tools were considered the most appropriate for answering the research question and analysis of the amount of data collected through the questionnaires. However if time for the research project could have allowed, it is likely that more data might have been collected. With the increase in data and the number of responses a deeper analysis of the research area by use of more sophisticated statistical tools might be done. In addition bigger array of data could form a basis for a multiple regression model. This model might be able to describe in statistical terms the relationship between different success factors and their impact on project success.

5.7 Highlights and Challenges in the Field

It was noted during the field visits that although most of the housing units were not completed on time and the beneficiaries were even asked to pay more due to the increased costs of construction, they still felt the projects were very successful. This is confirmed by the high level of confirmation recorded in Table 4.6, Section 4.4.1. Indeed from the literature review, it noted that project success is a matter of perception by the different stakeholders involved in the specific project. The final impact that the projects have created was so big that no one remembers the original missed goals. The projects have been successful for the beneficiaries but need improvement from the project management perspective.

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APPENDICES

Appendix 1: Letter of introduction

Raphael Mono Owoko
Ministry of Housing/HID
P. O. Box 30119-00100
Nairobi

To
.....
.....
.....

Dear Sir/Madam,
Re: Request for Data Collection

I am a student at Kenyatta University undertaking a Master of Business Administration degree, project management option. I am carrying out a project on the topic; "**Determinants of successful delivery of housing construction projects in the Ministry of Housing in Nairobi, Kenya**". Your firm has been sampled, having participated in some of the housing construction projects in the Ministry of Housing.

The purpose of this letter therefore is to request to allow me administer a questionnaire to you and some of the members of your firm and collect valuable information which will enable me complete my studies. The information obtained from you will be treated in confidence and shall be used for academic purpose only.

Thanking you in advance.

Yours sincerely,

Raphael Mono Owoko

Appendix 2: Letter of introduction from the University

KENYATTA UNIVERSITY
SCHOOL OF BUSINESS
DOCTORAL & MBA COORDINATION OFFICE

P. O. Box 43844
NAROBI
KENYA
Tel: 8710901 -19 Ext. 57500

18th October, 2012

TO WHOM IT MAY CONCERN:

RE: RAPHAEL MONO OWOKO – D53/OL/15272/08

This is to confirm that the above named is a master of Business Administration **MBA (Project Management)** Student in the **School of Business, Kenyatta University.**

He is through with course work and has successfully defended his Masters Degree proposal (**Determinants of successful delivery of housing construction projects in Ministry of Housing in Nairobi Kenya**) and has done all the corrections that were pointed out by the examiners during the defense. He is now embarking on data collection.

Any assistance accorded to him will be much appreciated by this office.

Thank you.

KENYATTA UNIVERSITY OFFICE OF THE COORDINATOR 18 OCT 2012 P.O. BOX 43844 NAIROBI

RUTH WAKAPISI
FOR: DOCTORAL AND MBA PROGRAMME COORDINATOR

Appendix 3: Letter of Authorisation from the Ministry

MINISTRY OF HOUSING

Telegrams "MINHOUSING"
Telephone: 254 (20) 2718050/2710451/2

FAX 254-020-2734886
When replying please quote

1ST NGONG AVENUE
OFF NGONG ROAD
P.O. BOX 30119
NAIROBI

Ref: No. : MH/4//11/1/(32)

8th October, 2012

Raphael Mono Owoko
Senior Assistant Director, Housing Infrastructure
Ministry of Housing
NAIROBI

RE: APPROVAL TO CONDUCT AN ACADEMIC RESEARCH PROJECT IN THE MINISTRY – RAPHAEL MONO OWOKO

Reference is made to your request dated 21st September, 2012 to research project under the topic; **"Determinants of successful Delivery of Housing construction projects in the** Ministry of Housing in Nairobi, Kenya", as a partial fulfilment of for the award of the degree which is approved by the university.

This is to confirm that you are allowed to research. You will be required to abide by the general standards of academic research. The Ministry will also require you to submit a report of your findings and recommendations.

Catherine Mwenda, (Mrs.)
For: PERMANENT SECRETARY

HRD/amn

Appendix 4: QUESTIONNAIRE SURVEY FOR PROJECT PARTICIPANTS (Summary)

This questionnaire has three parts, Part A, B and C. The information gathered from this research will be treated with CONFIDENTIALITY and used for academic purposes ONLY.

Please fill in all the questions as provided.

Part A: General Information

1. Name of your organization _____

2. What is your primary profession? _____

3. How many years of experience do you have in building construction projects?

☐ 0-5 years ☐ 6-10 years

☐ 11-15 years ☐ 16-20 years

☐ 21 years and above

4. How many building/housing construction projects have you participated in for the Ministry of Housing in the last five (5) years?

☐ 1 ☐ 2

☐ 3 ☐ 4

☐ 5 and above

5. What was your primary role in the above projects? (Please tick appropriate box)

☐	Employer's Representative	☐	Project Manager	☐	Project Officer
☐	Architect	☐	Quantity Surveyor	☐	Structural Engineer
☐	Civil Engineer	☐	Mechanical Engineer	☐	Electrical Engineer
☐	Main Contractor	☐	Sub-contractor	☐	Construction Manager
☐	Clerk of Works	☐	Site Agent	☐	NEMA (EIA) Expert
☐	Foreman	☐	Other (Please specify)	☐	

Part B: Project Features

6. Were the projects you participated in generally completed:

a) On Time? ☐ Yes ☐ No

If No, why? _____

b) On Budget? ☐ Yes ☐ No

If No, why? _____

c) To Specification? ☐ Yes ☐ No

If No, why? _____

7. In a scale of 1-5 (**1**-Very Dissatisfied, **2**-Dissatisfied, **3**-Neutral, **4**-Satisfied and **5**-Very Satisfied) how were the projects generally received by the Client/Customers?

☐ 1 ☐ 2

☐ 3 ☐ 4

☐ 5

8. Were the projects licensed by the Environmental Authority?

☐ Yes No ☐

If No, why? _____

9. Please list as many indicators as possible of a successful housing construction project.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Part C: Factors Affecting Project Success

10. For the following matrix questions C1-C7, please grade by ticking (√) appropriately each factor based on its importance on contributing to housing construction project success in the Ministry of Housing. Assign grades according to the following scale: **1**-Not Important, **2**- Somewhat Important, **3**-Neutral, **4**-Important and **5**-Very Important

C1:	**Project Management Factors**	**1**	**2**	**3**	**4**	**5**
1.	Implementing an effective communication system	☐	☐	☐	☐	☐
2.	Control mechanism in place	☐	☐	☐	☐	☐
3.	Project scope/size	☐	☐	☐	☐	☐
4.	Feedback capabilities	☐	☐	☐	☐	☐
5.	Troubleshooting	☐	☐	☐	☐	☐
6.	Proper planning and scheduling	☐	☐	☐	☐	☐
7.	Effectiveness in coordination	☐	☐	☐	☐	☐
8.	Decision making effectiveness	☐	☐	☐	☐	☐
9.	Project monitoring and evaluation	☐	☐	☐	☐	☐
10.	Developing an appropriate project organization structure (Reporting system)	☐	☐	☐	☐	☐
11.	Implementing an effective safety system	☐	☐	☐	☐	☐
12.	Implementing an effective quality assurance system	☐	☐	☐	☐	☐
13.	Coordination and control of sub-contractors' work	☐	☐	☐	☐	☐
14.	Prior project management experience	☐	☐	☐	☐	☐
15.	Risk identification and allocation	☐	☐	☐	☐	☐
16.	Formal dispute resolution process	☐	☐	☐	☐	☐
17.	Motivation/Incentives	☐	☐	☐	☐	☐
18.	Clear project objectives	☐	☐	☐	☐	☐

11. What other project management factors do you think affect project success?

_____

_____

12. Assign grades according to the following scale: **1**-Not Important, **2**-Somewhat Important, **3**-Neutral, **4**-Important and **5**-Very Important

C2:	**Project Manager Factors**	**1**	**2**	**3**	**4**	**5**
1.	Project Manager's competence	☐	☐	☐	☐	☐
2.	Project Manager's experience	☐	☐	☐	☐	☐
3.	Project Manager's authority to make day-to-day decisions	☐	☐	☐	☐	☐
4.	Project Manager's authority to make financial decision, selecting key team members, etc.	☐	☐	☐	☐	☐
5.	Technical capability of project manager	☐	☐	☐	☐	☐
6.	Project manager's leadership skills	☐	☐	☐	☐	☐
7.	Organizing skills of project manager	☐	☐	☐	☐	☐
8.	Coordinating ability and rapport of project manager with contractors/ subcontractors	☐	☐	☐	☐	☐
9.	Coordinating ability and rapport of project manager with owner/ owner representatives	☐	☐	☐	☐	☐
10.	Motivating skills of project manager	☐	☐	☐	☐	☐
11.	Project manager's commitment to meet quality, cost and time	☐	☐	☐	☐	☐
12.	Project manager's early & continued involvement in project	☐	☐	☐	☐	☐
13.	Project manager's adaptability to changes in project plan	☐	☐	☐	☐	☐
14.	Project manager's ability to delegate authority	☐	☐	☐	☐	☐
15.	Construction control meetings (site meetings)	☐	☐	☐	☐	☐

13. Is the project manager a necessary addition to modern day projects?

_____

_____

14. Assign grades according to the following scale: **1**-Not Important, **2**-Somewhat Important, **3**-Neutral, **4**-Important and **5**-Very Important

C3:	**Procurement Factors**	**1**	**2**	**3**	**4**	**5**
1.	Project bidding method (e.g. price based competitive open bidding, restricted bidding)	☐	☐	☐	☐	☐
2.	Project contract mechanism (e.g. lump sum, unit price, cost plus, fluctuation, fixed price etc.)	☐	☐	☐	☐	☐

15. What suggestions would you make to improve the public procurement system for the procurement of construction projects?

_____

_____

16. Assign grades according to the following scale: **1**-Not Important, **2**-Somewhat Important, **3**-Neutral, **4**-Important and **5**-Very Important

C4:	**Design Team Factors**	**1**	**2**	**3**	**4**	**5**
1.	Design team qualification and experience	☐	☐	☐	☐	☐
2.	Project design complexity	☐	☐	☐	☐	☐
3.	Mistakes/ delays in producing design documents	☐	☐	☐	☐	☐
4.	Team leaders coordination ability	☐	☐	☐	☐	☐
5.	Adequacy of plans and specifications	☐	☐	☐	☐	☐

17. What other Design Team related factors would influence the success of housing construction projects? Explain _____

_____

18. Assign grades according to the following scale: **1**-Not Important, **2**-Somewhat Important, **3**-Neutral, **4**-Important and **5**-Very Important

C5:	Client Team Factors	1	2	3	4	5
1.	Influence of Employer/ Employer's representative	☐	☐	☐	☐	☐
2.	Employer's knowledge and experience of construction project organization	☐	☐	☐	☐	☐
3.	Employer's confidence in construction team	☐	☐	☐	☐	☐
4.	Employer's clear and precise definition of project scope & objectives	☐	☐	☐	☐	☐
5.	Employer's/Representatives' timely decision	☐	☐	☐	☐	☐
6.	Employer's risk attitude (willingness to take risk)	☐	☐	☐	☐	☐
7.	Employer's emphasis on low construction cost	☐	☐	☐	☐	☐
8.	Employer's emphasis on high quality of construction	☐	☐	☐	☐	☐
9.	Employer's emphasis on quick construction	☐	☐	☐	☐	☐
10.	Employer's project management experience	☐	☐	☐	☐	☐
11.	Employer's ability to brief the stakeholders	☐	☐	☐	☐	☐
12.	Employer's ability to make decision	☐	☐	☐	☐	☐
13.	Employer's ability to define roles	☐	☐	☐	☐	☐
14.	Employer's ability to honour contractor's certificates on time	☐	☐	☐	☐	☐

19. How do you determine the client in public sector projects? _____

_____

20. What should be his major role in influencing project success? _____

_____

_____

21. Assign grades according to the following scale: **1**-Not Important, **2**-Somewhat Important, **3**-Neutral, **4**-Important and **5**-Very Important

C6:	Construction Team Factors	1	2	3	4	5
1.	Contractors experience	☐	☐	☐	☐	☐
2.	Site management	☐	☐	☐	☐	☐
3.	Supervision	☐	☐	☐	☐	☐
4.	Ability to coordinate the activities of subcontractors	☐	☐	☐	☐	☐
5.	Contractor's cash flow	☐	☐	☐	☐	☐
6.	Effectiveness of cost control system	☐	☐	☐	☐	☐
7.	Speed of information flow	☐	☐	☐	☐	☐

22. What other construction team factors affect project success? Explain _____

_____

_____

23. Assign grades according to the following scale: **1**-Not Important, **2**-Somewhat Important, **3**-Neutral, **4**-Important and **5**-Very Important

C7:	External Environment Factors	1	2	3	4	5
1.	Economic environment (price variations, inflation etc)	☐	☐	☐	☐	☐
2.	Social environment (etc)	☐	☐	☐	☐	☐
3.	Political environment	☐	☐	☐	☐	☐
4.	Physical work environment (site conditions, weather etc)	☐	☐	☐	☐	☐
5.	Industrial relations environment (Labour laws etc)	☐	☐	☐	☐	☐
6.	Administrative approvals environment (Local authority approvals, NEMA, etc.)	☐	☐	☐	☐	☐
7.	Commitment of all parties to the project	☐	☐	☐	☐	☐

8.	Adequacy of funding from external sources, e.g. Treasury	☐	☐	☐	☐	☐
9.	Technology availability	☐	☐	☐	☐	☐
10.	Human Skill availability	☐	☐	☐	☐	☐
11.	X-Factor (fraudulent practices, corruption, favouritism, lack of ethics, etc.)	☐	☐	☐	☐	☐

24. What other environmental related factors are likely to influence the outcome of a construction project? Explain _____

_____

_____

25. What other recommendations/suggestions that would improve the success rate of housing construction projects in Kenya. _____

_____

_____

_____

_____

Thank you for your time and participation

Appendix 5: QUESTIONNAIRE SURVEY FOR PROJECT BENEFICIARIES (Summary)

This questionnaire has two parts, Part A, and B. The information gathered from this research will be treated with CONFIDENTIALITY and used for academic purposes ONLY.

Please fill in all the questions as provided.

Part A: General Information

1. Name of your Housing Project (Estate) _____

2. Please tick (√) your Job Group set from the table below at the time of your application for the housing unit.

☐	H and below	☐	J - L
☐	M and N	☐	P and Q
☐	R and above	☐	Other Specify _____

3. Please tick (√) your gender. Male ☐ Female ☐

4. Please indicate your age bracket.

☐	Under 21Years	☐	21 - 34 Years
☐	35 - 44 Years	☐	45 - 54 Years
☐	Over 55 Years		

5. Please indicate the number in occupation/ likely to occupy the housing unit.

☐ 2 and below persons ☐ 3-5 persons ☐ 6-8 persons

☐ 9 and above

Part B: Project Features

6. Have you occupied the Housing unit? Yes ☐ No ☐

If yes, for how long? _____

If No, why? _____

7. When were you allocated the housing unit?

☐ Before commencement of construction

☐ During construction

☐ At Completion of the construction

8. Please indicate your level of agreement/disagreement with the following statements by ticking (√) appropriately the ratings given below: Assign grades according to the following scale: **1**-Strongly Disagree, **2**-Disagree, **3**-Neutral, **4**-Agree and **5**-Strongly Agree.

B1:	**Communication**	**1**	**2**	**3**	**4**	**5**
1.	I received frequent communication on the status of my application	☐	☐	☐	☐	☐
2.	I received regular updates on the progress of the project during construction	☐	☐	☐	☐	☐
3.	I have continued to receive regular follow up information after occupancy	☐	☐	☐	☐	☐
4.	My enquiries on the project are usually addressed promptly	☐	☐	☐	☐	☐
5.	Clear and timely communication between providers and beneficiaries is important for the success of housing construction projects	☐	☐	☐	☐	☐

9. Apart from regular communication, is there any other way you wished the Ministry could have involved you during and after the construction of the housing project?

_____

_____

_____

10. Please indicate your level of agreement/disagreement with the following statements by ticking (√) appropriately the ratings given below: Assign grades according to the following scale: **1**-Strongly Disagree, **2**-Disagree, **3**-Neutral, **4**-Agree and **5**-Strongly Agree.

B2:	**Project Quality**	**1**	**2**	**3**	**4**	**5**
1.	The site is suitable for my family needs	☐	☐	☐	☐	☐
2.	The site has adequate parking and playground for the children	☐	☐	☐	☐	☐
3.	The number and organization of rooms is adequate for my family needs	☐	☐	☐	☐	☐
4.	The size and spaces offered by the individual rooms is adequate	☐	☐	☐	☐	☐
5.	The workmanship is of high quality	☐	☐	☐	☐	☐
6.	The materials used are of high quality	☐	☐	☐	☐	☐
7.	The materials used are economical to maintain	☐	☐	☐	☐	☐
8.	The design is pleasing to the eye	☐	☐	☐	☐	☐

11. Was the project completed on schedule? Yes ☐ No ☐

If No, were you informed of the reason for delay? Yes ☐ No ☐

If No, how did the delay affect you? _____

_____

12. Would you say that the project is a good value for your financial resource? _____

_____

13. Would you recommend the scheme to other colleagues? _____

14. Please suggest any other ideas that can make the scheme more beneficial to other civil servants _____

_____

Thank you for your time and participation

Appendix 6: Ranking of the 72 Factors

Code	Description	Mean	Rank
C6.1	Contractors experience	4.6042	1
C6.5	Contractor's cash flow	4.5833	2
C5.14	Employer's ability to honour contractor's certificates on time	4.5208	3
C6.2	Site management	4.5000	4
C7.8	Adequacy of funding from external sources, e.g. Treasury	4.5000	4
C2.3	Project Manager's authority to make day-to-day decisions	4.4792	6
C2.4	Project Manager's authority to make financial decision, selecting key team members, etc.	4.4167	7
C7.1	Economic environment (price variations, inflation etc)	4.4167	7
C4.3	Mistakes/ delays in producing design documents	4.3958	9
C1.6	Proper planning and scheduling	4.3958	9
C2.15	Construction control meetings (site meetings)	4.3750	11
C7.7	Commitment of all parties to the project	4.3542	12
C5.7	Employer's emphasis on low construction cost	4.3542	12
C1.14	Prior project management experience	4.3333	14
C1.9	Project monitoring and evaluation	4.3333	14
C1.7	Effectiveness in coordination	4.3125	16
C2.11	Project manager's commitment to meet quality, cost and time	4.2917	17
C4.1	Design team qualification and experience	4.2500	18
C5.9	Employer's emphasis on quick construction	4.1667	19
C1.1	Implementing an effective communication system	4.0000	20
C1.15	Risk identification and allocation	4.0000	20
C5.5	Employer's/Representatives' timely decision	3.9583	22
C2.1	Project Manager's competence	3.8958	23
C5.4	Employer's clear and precise definition of project scope & objectives	3.8958	23
C5.13	Employer's ability to define roles	3.8750	25
C1.2	Control mechanism in place	3.8333	26
C5.8	Employer's emphasis on high quality of construction	3.8333	26
C1.16	Formal dispute resolution process	3.8333	26
C5.2	Employer's knowledge and experience of construction project organization	3.8125	29
C5.1	Influence of Employer/ Employer's representative	3.8125	29
C1.8	Decision making effectiveness	3.7917	31
C2.2	Project Manager's experience	3.7917	31
C6.4	Ability to coordinate the activities of subcontractors	3.7917	31
C6.3	Supervision	3.7708	34
C2.5	Technical capability of project manager	3.7708	34
C5.10	Employer's project management experience	3.7708	34
C2.8	Coordinating ability and rapport of project manager with contractors/ subcontractors	3.7500	37
C2.14	Project manager's ability to delegate authority	3.7500	37
C5.6	Employer's risk attitude (willingness to take risk)	3.7500	37
C7.3	Political environment	3.7292	40
C1.13	Coordination and control of sub-contractors' work	3.7292	40
C7.9	Technology availability	3.7292	40
C5.12	Employer's ability to make decision	3.7083	43
C6.6	Effectiveness of cost control system	3.7083	43
C5.3	Employer's confidence in construction team	3.6875	45

C2.12	Project manager's early & continued involvement in project	3.6875	45
C5.11	Employer's ability to brief the stakeholders	3.6875	45
C7.2	Social environment (etc)	3.6875	45
C1.12	Implementing an effective quality assurance system	3.6667	49
C2.13	Project manager's adaptability to changes in project plan	3.6458	50
C4.4	Team leaders coordination ability	3.6458	50
C2.7	Organizing skills of project manager	3.6250	52
C2.6	Project manager's leadership skills	3.6250	52
C6.7	Speed of information flow	3.6250	52
C7.10	Human Skill availability	3.6042	55
C7.6	Administrative approvals environment (Local authority approvals, NEMA, etc.)	3.6042	55
C2.9	Coordinating ability and rapport of project manager with owner/ owner representatives	3.6042	55
C7.4	Physical work environment (site conditions, weather etc)	3.6042	55
C4.2	Project design complexity	3.6042	55
C1.11	Implementing an effective safety system	3.6042	55
C4.5	Adequacy of plans and specifications	3.5833	61
C3.1	Project bidding method (e.g. price based competitive, open bidding, restricted bidding)	3.5833	61
C1.18	Clear project objectives	3.5833	61
C2.10	Motivating skills of project manager	3.5625	64
C1.5	Troubleshooting	3.5625	64
C1.17	Motivation/Incentives	3.5417	66
C7.5	Industrial relations environment (Labour laws etc)	3.5208	67
C1.10	Developing an appropriate project organization structure (Reporting system)	3.5208	67
C1.4	Feedback capabilities	3.5000	69
C3.2	Project contract mechanism (e.g. lump sum, unit price, cost plus, fluctuations, fixed price etc)	3.4583	70
C1.3	Project scope/size	3.4583	70
C7.11	X-Factor (fraudulent practices, corruption, favouritism, lack of ethics, etc.)	3.2083	72

Source: (Author, 2012)