FACTORS INFLUENCING COMPLETION OF WATER PROJECTS IN KAKAMEGA COUNTY

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DECLARATION

This research project is my original work and has not been presented for a degree in any other university

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Signature Date

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This Research Project has been submitted for examination with my approval as the university supervisor.

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ABSTRACT

Inability to complete projects is among the challenges faced in the course of executing construction projects. The most widely used project success criterion is meeting time, quality and cost requirements. The main aim of this study was to investigate factors that influence completion of water projects in Kakamega County. The specific objectives of the study were to determine the effect of client related factors, contractor related factors, consultant related factors, and external factors. The instrument of data collection was questionnaires. The target population consisted of 104 employees working for two water projects in Mumias and Lugari both in management and lower levels. Simple random sampling was used to select 90 who formed the sample size out of which, 74 respondents returned the questionnaires representing 82% response rate. Analysis of data was done using descriptive and inferential statistics using correlation and regression. The main factors that were associated with client included financial capacity, owner interference, the imposition of contract duration , decision-making ability and change in project scope which had a weak but significant positive relationship with project completion ($r = 0.302$, $p < 0.05$). The contractor related factors studied were financial capacity, equipment availability and quality, skilled workforce, site management ability, material availability and control over sub-contractors which had a strong and significant positive relationship with project completion ($r = 0.668$, $p < 0.05$). Consultant related factors considered included experience, skilled personnel, co-ordination, site supervision and decision-making ability and they had a significantly strong positive relationship with project completion ($r = 0.643$, $p < 0.05$). External factors of political interference, industrial action, regulation, taxation and material unavailability in the market had a weak but significant positive relationship ($r = 0.312$, $p < 0.05$) with project completion. The overall regression model gave R^2 of 0.583. This showed that that the variations around the means in client-related factors, consultant-related factors, contractor-related factors and the external factor is about 58.3%. In conclusion, the most important factors influencing project completion were the contractor, consultant, external and client related factors respectively.

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LIST OF ABBREVIATIONS

KARI	Kenya Agricultural Research Institute
TOC	Theory of Constraints
KCG	Kakamega County Government
KWSC	Kakamega-Busia Water Supply Company

DEFINITION OF TERMS

Client related Factors: These are factors associated with the client such as payment to contractors (Kamotho, 2014).

Consultant related factors: Consultants are professionals (engineers or engineering firms) who ensure that the project is completed to the right quality against technical specifications and design standards, on time and within budget i.e. gives the employer value for money and thus consultant related factors are those associated with consultants in the execution of projects (Dadzie, Abdul-Aziz, & Kwame, 2012).

Contractor related Factors: Factors are those which arise due to the role of the contractor in the implementation of the project for example contractor capacity and site (Nwachukwu & Emoh, 2011).

External Factors: Events which are beyond the control of the client, contractor or consultant of the project (Fugar & Agyakwah-Baah, 2010).

Project completion: A project which is done within budget, completed within scheduled time and satisfying client's specifications (Nwachukwu & Emoh, 2011).

CHAPTER ONE

INTRODUCTION

1.1 Background

The construction industry plays a significant role in socio-economic development as it provides the basis upon which other sectors can grow by constructing the physical facilities required for the production and distribution of goods and services. The most common criteria for measuring project success is based on the triple constraint model; time cost, the scope with quality being the central theme. Any change in one of the factors affects the other two. For instance, an increase in scope without a corresponding increase in time and cost leads to poor quality of work or decrease in time without a decrease in scope leads to poor quality if cost remains constant. According to Mbaluku and Bwisa (2013), a project is generally considered to be successfully implemented if it is on schedule, within budget, and achieves basically all the goals originally set for it and is accepted and used by the clients for whom it is intended.

Inability to complete projects in time is among the challenges faced in the course of executing construction projects (Kikwasi, 2012). Choge and Muturi (2014) explained that achieving project completion on time, within budget, at specified quality standards, and most importantly without unprecedented cost escalations is a major criterion of success of a project. This research focused on completion of projects in terms of quality (satisfying client specifications), time and cost.

There are many factors that affect project completion. Sambasivan and Soon (2007), studied factors that influenced completion time in Malaysian construction projects and categorized them into four categories as client related, contractor related, contract relationship related and external factors. They also identified major effects of delays in completion of projects as time overrun, cost overrun, dispute, arbitration, litigation, and total abandonment.

The construction industry in Kenya faces a lot of challenges such as expenditure exceeding the budget, delay to complete the project in time, the building defects and over-reliance on foreign workers (Choge & Muturi, 2014). Therefore, due to the huge investments, it is necessary to study the factors which influence project completion of projects in order to realize the economic and social benefits of these projects and also eliminate such effects such as cost over- runs and possibly low-quality products.

Various studies have been carried out to investigate the factors affecting completion of construction projects. Kaliba, Muya, and Mumba (2009), found that the major factors that inhibited completion of road construction projects in Zambia were delayed payments, financial deficiencies on the part of the client or the contractor, contract modifications, economic problems, material procurement problems, changes in design drawings, staffing problems, unavailability of equipment, poor supervision, construction mistakes, poor coordination on site, changes in specifications, labour disputes and strikes. A study by Abd El-Razek, Bassioni, and Mobarak (2008) found that delayed payments, slow delivery of payments, coordination problems, and poor communication hindered completion of construction projects in Egypt. Motaleb and Kishk (2010), found that change orders, financial and other client-related factors are the most significant causes of delay in project completion time in the United Arab Emirates. This indicates that there are various factors that influence completion of projects and it seems to vary from country to country but there is convergence on financial constraints as a major factor.

In Kenya, Kamotho (2014), studied the effect of project management, contractors, consultants and finance in project performance for housing projects in Nairobi County while Ondari and Gekara (2013) studied the effect of management support, design specifications and contractor capacity on the completion of road projects. Mbaluku and Bwisa (2013), studied time delay factors for housing projects of Kenya Agricultural Research Institute (KARI)

Infrastructure Projects are implemented in order to provide economic services from utilities (like electricity, telecommunication, and water) and transport (roads, bridges, seaport, and airports) and are central in promoting economic development. However, unsuccessful implementation of such projects, therefore, means that the enjoyment of such services and the corresponding economic benefits are delayed or never

achieved (Ndungu, 2014). Kenyan Government's target is ensuring that the country's population has access to adequate water and sanitation services as per vision 2030.

According to Ndungu (2014), implementation of water projects in Kenya faces various challenges such as inexperienced project managers, inadequate monitoring of ongoing projects, inefficient resource utilization, and delayed disbursement of project development funds as some of the key challenges hampering progressive improvement in water supply coverage. This, therefore, means that these projects are not completed as scheduled which lead to frustration to all the parties involved.

This study focused on projects undertaken in Kakamega County. This would be hoped to fill the gaps left by other researchers in Kenya who have studied projects which are located in and around Nairobi and thus they recommended studies on rural and suburban counties (Kamotho, 2014), and other factors outside the project as suggested by Ndungu (2014).

1.2 Problem Statement

Unsuccessful completion of projects is a common problem in the construction industry not only with an immeasurable cost to society but also with debilitating effects on the contracting parties (Ondari & Gekara, 2013). According to Sambasivan and Soon (2007), failure to achieve targeted time, budgeted cost and specified quality result in various unexpected negative effects on the projects. Most projects face problems of completion.

Kenya has invested heavily in infrastructural projects aimed at making Kenya industrialized by 2030. However, these projects face problems of delays, cost overruns and failure to achieve the intended quality requirements (Kamotho, 2014; Ndungu, 2014; Ondari & Gekara, 2013). The failure to complete projects leads to various problems to the parties involved including disputes and litigations (Braimah, 2013). According to reports by Water Services Regulatory Board and Ministry of water and irrigation in the year 2013, 57% of completed projects in the board's area were completed late while 86% of ongoing projects were behind schedule (Ndungu, 2014)

Although various studies have been done on factors influencing completion of construction projects, a study need to done in projects in rural and sub-urban areas as per recommendation of Kamotho (2014). It would also fill the gap existing on factors influencing completion of water projects undertaken by Athi Water Services Board Ndungu (2014) which covered influence of finance, contractor's capacity, Monitoring, and contract variations.

1.3 Research Objectives

1.3.1 General Objective

The general objective of this study was to investigate the factors influencing the completion of water projects in Kakamega County.

1.3.2 Specific Objectives

i) To determine the effect of client related factors on project completion
ii) To determine the effect of contractor related factors on project completion
iii) To determine the effect of consultant related factors on project completion
iv) To determine the effect of external factors on project completion

1.4 Research Questions

i) What was the effect of client related factors on project completion?
ii) What was the effect of contractor related factors on project completion?
iii) What was the effect of consultant related factors on project completion?
iv) What was the effect of external factors on project completion?

1.5 Justification of the Study

Construction projects if not completed on time, within budget and as per the client specifications have an adverse effect on parties (owner, contractor, consultant) to a contract in terms of a growth in adversarial relationships, distrust, litigation, arbitration, cash-flow problems, and a general feeling of apprehension towards each other. So, it is essential to define the factors that influence the completion of projects in order to minimize and avoid the delays in any construction project (Megha & Rajiv, 2013).

The problem of delays in the construction industry is a global phenomenon (Sambasivan & Soon, 2007) and therefore, Kenya is not an exception. Project completion time has always been recognized as an important indicator of project success (Korir & Were, 2014). Other success criteria include quality and cost (Kaliba et al., 2009). This study tries to investigate the main factors that influence the completion of construction projects specifically water projects in Kenya using Kakamega County as a case study. This would help various actors involved in the construction industry to mitigate disruptions associated with construction projects. Since this study will focus on both internal factors (Client related, consultant and contractor related) and external factors (those beyond the control of the contracting parties), it will help project implementers and other stakeholders in the development of planning tools which help in proper scheduling, budgeting and scope control in construction projects.

1.6 Scope of the Study

The study covered water projects in Kakamega County. The projects which were considered were in Lugari and another one in Mumias. The Lugari water project is under the Kakamega County Government (KCG) while the Mumias one is under Kakamega-Busia Water Supply Company (KWSC). The Lugari water purification project had a total of 68 employees (KCG, 2015) while Mumias water project had 36 employees (KWSC, 2015), which formed the target population. The data collection was carried out in August and September 2015.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews existing literature relating to the research problem outlined in the previous chapter with a particular focus on the main variables in the study. The theoretical framework the study is based on and the conceptual framework illustrating the relationship between different variables in the study are also outlined.

2.2 Theoretical Review

2.2.1 Complexity Theory

Project management systems are considered dynamic systems, similar to those in nature, which means they change over time and are hard to predict. The complexity in projects can be in the form of structural, uncertainty, dynamic and social. Project time management is an important component in professionally managed projects in which many complexities and uncertainties occur and as a result, many activities in a project are often behind the schedule (Ahmadi & Golabchi, 2013) .According to Dadzie et al. (2012) , the construction industry is complex in its nature because it comprises large numbers of parties as owners (clients), contractors, consultants, stakeholders, and regulators

Project complexity has a direct relationship to project performance. According to Williams (2005), reciprocal interdependencies bring a significant contribution to project complexity leading to reworks and feedback effects that translate into delays as the project deviates from the initial schedule and adopts an unpredicted behaviour. Olatunji (2010), argue that the unique nature of the construction process presents complexities, uncertainties, and changing circumstances, which must be accommodated within the planning and control system used.

Therefore, structural complexity is a trigger of project delay, cost over-runs, and scope challenges through its constituent elements, size and interdependencies as project managers have difficulties in managing large and complicated projects. Furthermore, uncertainty is by definition impeding project managers in making accurate forecasts

and thus underestimating project completion dates and costs (Miterev & Nedelcu, 2013).

2.2.2 Constraints theory

The theory of constraints (TOC) can be used to demonstrate how managers can effectively manage organizations based on the assumption of system thinking and constraint management (Kohli & Gupta, 2010) . TOC-based management philosophy focuses on change at three levels; mind-set of the organization, measures that drive the organization, and methods employed within the organization (Gupta & Boyd, 2008).

Needs and constraints in a multi-party working situation which is necessary for construction projects bring complications in project management (Lau & Kong, 2006) and therefore for effective project management, constraints have to be managed. According Jacob and McClelland (2001), most projects are difficult to manage because they involve uncertainty, and involve three different and opposing commitments i.e. due date, budget, and content.

Triple constraints criteria (time, scope and cost) in project management have been accepted as a measure of project success. Project managers regard triple constraints as key to a project's requirements and success. Optimizing these three features ascertain project quality and timely completion. All three constraints of projects - scope (a measure of quality), cost and time - have their respective effects on projects' performance but since these elements have some correlation, one constraint bears an effect on the other two, eventually affecting projects deliverables to a greater extent (Hamid, Ghafoor, & Shah, 2012).

This study is based on the triple constraint theory where. Delays in project completion are a common problem in the construction industry not only with an immeasurable cost to society but also with debilitating effects on the contracting parties (Ondari & Gekara, 2013). Other factors which measure project performance include cost and quality requirements (Nwachukwu & Emoh, 2011).

2.3 Conceptual Framework

A conceptual framework is a representation of the main concepts or variables under study and their presumed relationship with each other and it is a scheme of variables/concepts the researcher will operationalize in order to achieve the research objectives (Imenda, 2014). The conceptual framework used in this study is indicated in figure 2.1 below. The dependent variable is project completion while the independent variables are client-related factors, contractor related factors, consultant related factors, and external factors.

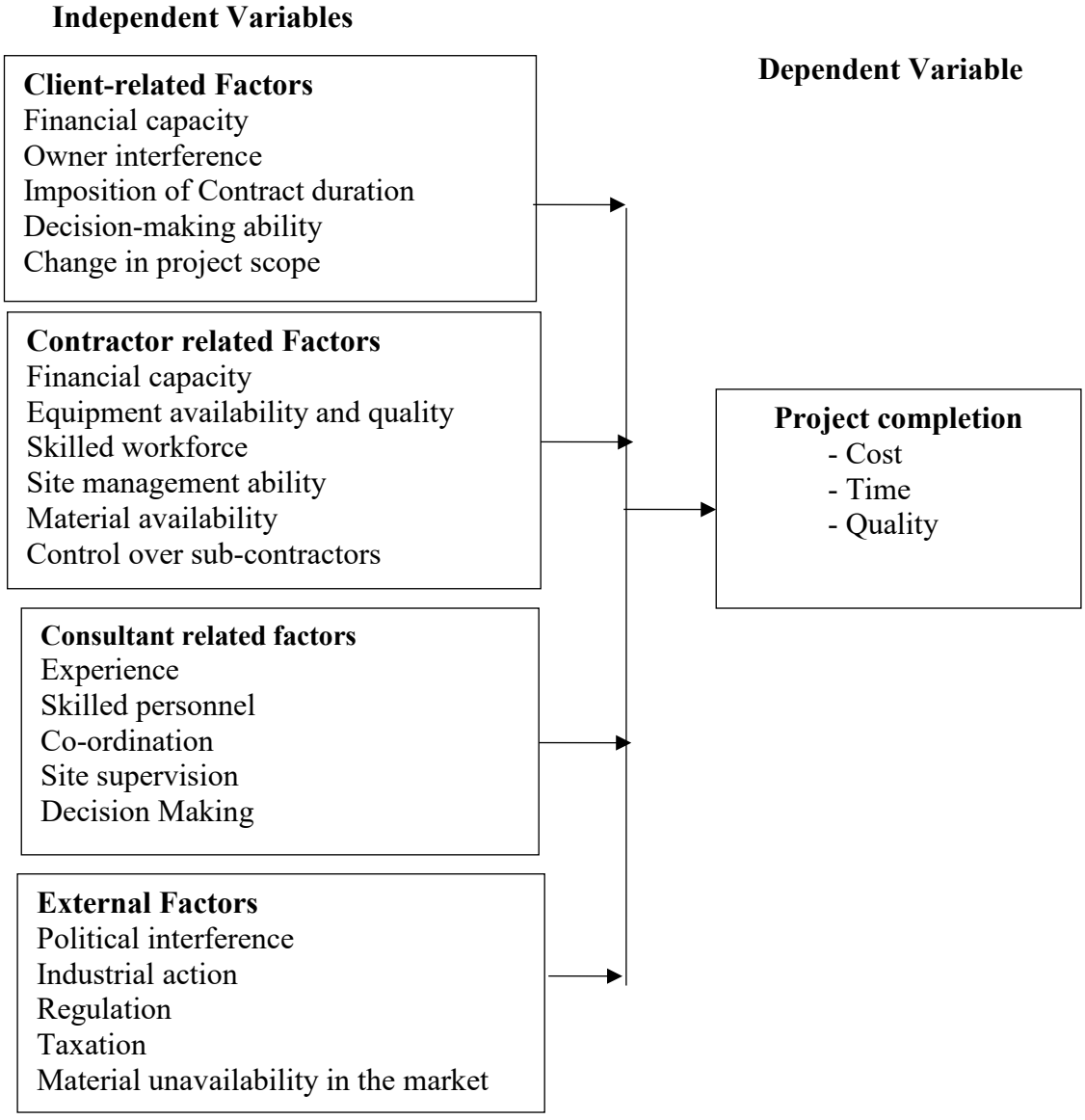

Figure 2.1 Conceptual Framework

2.3.1 Client Related Factors

There are two types of clients; public and private clients. Private clients could further be divided into private (home dwellings) and private commercial. It is important that private clients understand the design, procurement, and construction processes. The clients provide valuable information which may help various participants to improve their performance on a project. Clients are either experienced or inexperienced (Olatunji, 2010).

The main important role of the client is financing the project. Finance is an integral factor that leads to project success. Failure to access project funds results in time delays and even abandonment (Kamotho, 2014). There are various sources of funding for construction projects. Kamotho (2014), established the inability of developers to honour payments on time was as the major factor that caused delays in building construction projects. Sambasivan and Soon (2007), found client related factors which influence project completion were finance and payments of completed work, owner interference, slow decision making and unrealistic contract duration imposed by owners for projects in Malaysia which were similar to those found by Abd El-Razek et al. (2008) projects in Egypt

A study by Muhwezi, Acai, and Otim (2014) found client related factors as the second most important responsible for delays, and therefore completion, of building projects in Uganda after consultant related factors and they suggested that clients should ensure that their demand in design changes during the construction period should have no adverse effects on the critical activities so as to avoid causing delays.

2.3.2 Contractor Related Factors

Contractors are practitioners who are authorized are to execute projects conceptualized and designed by consultants and under their supervision. They are typically categorized as local or international, the locals being further categorized as national or regional. They include the civil engineering, structural contractors, and water and sanitation contractors for roads, housing, and water projects respectively (Kamotho, 2014).

According to Nwachukwu and Emoh (2011), contractors and sub-contractors are individuals or firms that undertake to perform required construction work in return for a contract price. Contractors may be categorized as prime contractors and subcontractors where prime contractors have a contractual relationship with the owner, whereas subcontractors have a contractual relationship with the prime contractor or with another subcontractor (Kamotho, 2014).

Contractors are selected on the basis of price, experience in undertaking particular types of construction projects and their reputation or track record in producing high-quality work within the budget and on time. In most cases there is a trade-off between price, experience and track record but the desire to accept the lowest tender does not always lead to a project that is completed within time and budget (Choge & Muturi, 2014).

Contractors played a significant role in influencing completion of construction projects where Sambasivan and Soon (2007), found contractor related factors included delays caused by the subcontractor, site management, improper construction methods, improper planning and errors during construction, and inadequate contractor experience. Kaliba et al. (2009), found that the major causes of delays and cost over-runs in construction projects were financial deficiencies on the part the contractor, material procurement problems, staffing problems and unavailability of equipment.

Koushki and Kartam (2004), identified the main factors affecting cost and time overrun as inadequate/inefficient equipment, tools, and plants; unreliable sources of materials on the local market. Mydin, Sani, Salim, and Alias (2014), found poor site management, financial problem, coordination problem with other , construction mistakes and defective work , delay in delivery of material to site , low productivity of labour , shortage of material on site , poor skills of labour and shortage of site labour as the contractor related factors that hinder completion of projects in Malaysian construction industry.

2.3.3 Consultant Related Factors

Consultants are professionals in the construction industry who are qualified at degree level and who are mandated to conceptualize and design building projects which

would be executed by their counterparts, the contractors. For construction projects, they include engineers, quantity surveyors and architects. They provide supervision and inspection of the quality of works and in some instance act on behalf of the client in ensuring that the project is done as per the specifications.

Sambasivan and Soon (2007), found consultant related factors which affected completion of projects were those in relation to contract management, preparation, and approval of drawings, quality assurance and waiting time for approval of test and inspection. Kaliba et al. (2009) also found that consultants influenced completion of construction projects through, contract modifications, changes in design drawings, poor coordination on site, poor supervision and changes in specifications.

A study by Abd El-Razek et al. (2008), cited coordination problems and poor communication as consultant related factors that negatively affected completion of construction projects. According to Madhura and Desale (2013) delay in approving major changes in the scope of work by the consultant, late in reviewing and approving design documents inadequate project management assistance for execution were some of other factors that hindered completion of construction projects.

2.2.4 External Factors

These are factors outside the control of the client, contractor, and consultant. These external factors can influence project completion time. Mydin et al. (2014), found the following external factors responsible for completion of construction projects were; weather conditions on the site, poor site conditions, delay in manufacturing building material changes in laws and regulations, transportation delay, delay in performing final inspection and certification, lack of materials on the market and lack of equipment and tools on the market.

A study on, building projects in Uganda, by (Muhwezi et al., 2014), found that unfavourable weather conditions, legal disputes between project participants, shortage of construction materials, unexpected surface and subsurface conditions, delays in manufacturing materials and accidents during construction were the main factors

hampered completion of the projects and they recommended that all project stakeholders should work together and ensure that all disputes are mitigated during the construction period so as to avoid prolonging the planned executing time during the litigation process. They further recommended that stakeholders should ensure that proper planning must be done to cater for unforeseen events that may prolong the construction period, increase cost and cause damage to property and injury to project.

2.3.5 Project Completion

For a project to be said to be complete, it should satisfy three success criteria i.e. completed on time, within budget and meet client's specification (Nwachukwu & Emoh, 2011). Project completion time refers to the planned date for the delivery of the project specified in the contract (Megha & Rajiv, 2013) and it is usually indicated in the contract document. Completion of a project beyond the scheduled date constitutes delay or time overrun which has an effect on the quality and costs of the project (Fugar & Agyakwah-Baah, 2010).

Factors contributing to delays in project completion time can either be within the project or outside the project. According to (Kikwasi, 2012), factors within the project are those which are under the control of contracting parties who include the clients, consultants, and contractors.

For this study, project completion was measured using client satisfaction with the quality of work, employee satisfaction, project completion and project cost.

2.4 Empirical Review

For a project to be said to be successful, it must fulfil cost, quality and time constraints(Kaliba et al., 2009). Sambasivan and Soon (2007), studied factors responsible for delay in completion time of construction projects in Malaysia and categorized them into eight factors i.e. client related, consultant related factors, contractor related factors, material related factors such as quality of material and shortage in material, Labour and equipment related factors ,contract related factors, contract relationship related factors and external factors.

In road construction projects in Zambia, Kaliba et al. (2009), found that the major causes of delays, cost escalation and quality shortfalls in road construction projects in Zambia were delayed payments, financial deficiencies on the part of the client or the contractor, contract modifications, economic problems, material procurement problems, changes in design drawings, staffing problems, unavailability of equipment, poor supervision, construction mistakes, poor coordination on site, changes in specifications, labour disputes and strikes.

In Egyptian construction projects, Abd El-Razek et al. (2008), found that completion was hampered by slow delivery of payments, coordination problems, and poor communication. Koushki and Kartam (2004), identified the main factors affecting cost and time overrun as inadequate/inefficient equipment, tools, and plants; unreliable sources of materials on the local market and site accidents for construction projects in Kuwait. In Libya, the main causes of delays were improper planning, lack of effective communication, and the shortage of supply of materials i.e. steel, concrete, etc. design errors, slow decision making and financial issues (Tumi, Omran, & Pakir, 2009).

Motaleb and Kishk (2010), found that change orders, financial and other client-related factors are the most significant factors that affected completion of projects in the United Arab Emirates. They identified 42 factors and grouped then into five categories which included contractors, consultants, project managers, clients, financial and other unforeseen factors. Time and cost overrun were the two most important effects of untimely completion of projects, ranked first and second respectively by both consultants and project managers.

Completion time of groundwater projects in Ghana was negatively affected by poor contractor management, monthly payment difficulties from agencies, material procurement, poor technical performances, escalation of material prices and unexpected events Frimpong, Oluwoye, and Crawford (2003). They suggested that there was the need to improve contractor's managerial skills and the establishment of effective material procurement systems within projects to minimize delays in groundwater projects.

In Tanzania, a study by Kikwasi (2012), found the main factors that influenced the completion of construction projects were design changes, delays in payment to

contractors, information delays, funding problems, poor project management, compensation issues and disagreement on the valuation of work done and it therefore recommended that adequate construction budget, timely issuing of information, finalization of design and project management skills should be the main focus of the parties involved in project management.

2.5 Critique of Existing Literature

Factors influencing completion of projects can be internal and external factors. Internal factors arise from the parties to the contract (e.g. contractor, client, and consultant). External factors, on the other hand, arise from events beyond the control of the parties (Fugar & Agyakwah-Baah, 2010).

A study by Ndungu (2014), covered financing, monitoring, contractor's capacity and contract variations as factors influencing project completion time. This only covered one parameter of project success (time), it did not cover other parameters of project success such as time and quality. These are mainly factors within the project. Others such as political, regulatory changes, decision-making, and co-ordination etc also affect project completion.

Factors affecting completion of housing projects was studied by Kamotho (2014), who covered project management, contractors, consultants, and finance. This study also excluded external factors and was also for urban setting and therefore there was a need to have projects in rural areas with unique challenges. Gaturu and Muturi (2014), studied educational levels and training of project staff, promptness in the release of funds by donors and regularity monitoring and thus it covered projects funded through foreign institutions, which might limit generalization on other projects, which has other sources of funding. A study by Ondari and Gekara (2013) on road projects investigated the effect of management support, design specifications and contractor capacity on project completion. This covered road projects and concentrated on internal factors. It left out other factors such as consultant related and external factors.

Most researches in Kenya have concentrated on factors within the project (Gaturu & Muturi, 2014; Kamotho, 2014; Mbaluku & Bwisa, 2013). However, some studies have shown that other factors outside the control of contracting parties can influence

completion of projects (Abd El-Razek et al., 2008; Kaliba et al., 2009; Koushki & Kartam, 2004; Motaleb & Kishk, 2010)

2.6 Summary

Project completion time, cost and quality objectives are an important parameter for measuring project completion. The major causes of unsuccessful completion of construction projects around the world were delayed payments, financial deficiencies on the part of the client or the contractor, contract modifications, economic problems, material procurement problems, changes in design drawings, staffing problems, unavailability of equipment, poor supervision, construction mistakes, poor coordination on site, changes in specifications, labour disputes and strikes, coordination problems, poor communication, site accidents (Abd El-Razek et al., 2008; Frimpong et al., 2003; Kaliba et al., 2009; Kikwasi, 2012; Koushki & Kartam, 2004; Madhura & Desale, 2013; Motaleb & Kishk, 2010). In Kenya, the main factors that influence project completion included project management, contractors, consultants, finance, management support, design specifications (Kamotho, 2014; Mbaluku & Bwisa, 2013; Ondari & Gekara, 2013). These studies were for selected housing and road projects in Nairobi County. A study for water projects, implemented by Athi Water Services Board in Kiambu County, by Ndungu (2014), found that finance, contractor's capacity, Monitoring, and contract variations were the main factors that influenced completion time.

2.6 Research Gaps

In Kenya, the studies on factors influencing completion of construction projects concentrated on few factors such as contractor capacity and experience, consultants, finance as a client factor, management support and design specifications. This research sought fills the gap suggested by Mbaluku and Bwisa (2013) on the need to carry out research on factors influencing completion of projects of other public institutions. This research also furthered on the work of Kamotho (2014) who studied factors influencing completion of housing projects in Nairobi County and suggested that research on rural areas and other factors outside the project such as economic factors, legal/political factors which have been found to cause delays in other countries. This research also focused on water projects which has unique challenges as compared to

housing and roads which have been done by other researchers and also adds into the study by Ndungu (2014) which covered influence of finance, contractor's capacity, Monitoring, and contract variations on completion time of water projects in Kiambu County by bringing the unique challenges in Projects in Kakamega County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives an explanation and justification of the methods that was used in order to answer the research questions posed. These include the research design, target population, sample and sampling procedure, data collection instruments and data analysis techniques.

3.2 Research Design

Research design according to Kothari (2004) constitutes the blue- print for the collection, measurement, and analysis of data. This study adopted a descriptive survey research design. Mugenda and Mugenda (2003) explain that descriptive survey design determines and reports the way things are or answers questions concerning the current status of the subjects in the study. This study was carried out to determine the factors influencing the completion of water projects. It involved the establishment of relationships between the variables considered which can best be described using correlation which is type of descriptive research design as it does not manipulate the existing information but it simply captures a pre-existing association between the variables.

3.3 Target Population

The target population, according to Mugenda and Mugenda (2003), should have some observable characteristics, to which the study intends to generalize the results. In this study, the target population included all the employees working in the two water projects. According to Kakamega –Busia water supply company records, the people working at Mumias water project were 36 (KWSC, 2015). While Kakamega County records indicated that 68 people were working for Lugari water purification project (KCG, 2015). Therefore, a total of 104 people formed the target population.

3.4 Sampling Frame

The sampling frame consists of all the employees working in the two water projects as indicated in Table 3.1

Table 3.1: Sampling Frame

Position	Lugari Project Number	Mumias Project Number
Site Agent	1	1
Deputy Site Agent	1	1
Engineer	3	1
Assistant Engineer	3	0
Surveyors	4	2
Technicians	9	5
Artisans	16	9
Casual workers	31	17
Total	**68**	**36**

Source: Company and County Reports (KCG, 2015; KWSC, 2015)

3.5 Sample Size and Sampling Technique

Simple random sampling was used to choose the respondents in this study. This is because it affords equal chance for the subjected to be selected and according to Kothari (2004), it is the best sampling technique of picking a representative sample from a population. Random sample of 90 people was selected to be respondents in the study which is higher than 75 suggested by Bartlett, Kotrlik, and Higgins (2001) for a target population less than 200 at 5% significance level. From this sample, 31 were sampled in Mumias water project and 59 selected randomly to respond in Lugari water project.

3.6 Research Instrument

Primary data sources were utilized in the collection of data in this research. Questionnaires were administered to all the identified respondents. The questionnaire contained closed-ended questions for ease of analysis. The questionnaire to be

administered to the respondents was split into two sections where the first section captured the general information such as age, gender, professional qualifications and experience while the second section contained information on factors influencing completion of construction projects.

The respondents were required to rank the factors influencing completion on a 5-point Likert scale as follows; 1 for strongly disagree, 2- disagree, 3- neutral, 4 – agree and 5 – strongly agree.

3.7 Data Collection Procedure

The researcher collected primary data through the administration of questionnaires to the employees in the two water projects. The questionnaires were delivered to the respondents by the researcher personally and through research assistants contracted by the researcher.

3.8. Pilot Study

The questionnaires were administered to 12 respondents which represented more than 10% of the total sample recommended by Connelly (2008). After they had filled them, the same instruments were re-administered to the same respondents after some lapse of time. The answers from both tests were compared to look for consistency.

3.9 Instrument Validity and Reliability

3.9.1 Validity

Instrument validity is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study (Mugenda & Mugenda, 2003). To achieve this, both internal and external validity of research instruments has to be ensured. Internal validity refers to the instrument's ability to measure what is intended to be measured while content validity refers to the extent to which the questions provide adequate coverage of the subject matter. It can be determined by using a panel of persons who shall judge how well the measuring instrument meets the standards, but there is no numerical way to express it.

Supervisors were used in the evaluation of the applicability and appropriateness of the content, clarity and adequacy of the research instrument from a research perspective. Validity was also checked during piloting to ensure all the items to be in the main study were functioning.

3.9.2 Reliability

Reliability is a measure of the degree to which a research instrument yields consistent results or data on repeated trials (Mugenda & Mugenda, 2003). According to Fraenkel and Wallen (2008), in relation to reliability, you assess how consistent the scores were for each individual from one administration of an instrument to another and from one set of items to another. Reliability of the instrument will be tested using the test-retest technique through a pilot study.

Cronbach's alpha was used to measure the reliability of the questionnaire. Cronbach's alpha is usually computed from the following formula (Alinaitwe, *et al,* 2013*);*

$$Alpha = \frac{NC}{v+(N-1)C} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where N = the number of items, v = the average variance and C = the average inter-item covariance.

The value of Cronbach's alpha coefficient was above 0.7 for all the questions in the various categories and thus, the questionnaire was adopted and used for the study. The reliability coefficients for the various variables as indicated in Table 3.2

Table 3.2: Reliability statistics

	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Client related factors	.765	.761	10
Contractor related factors	.753	.757	10
Consultant related factors	.776	.775	8
External related factors	.719	.704	7
Project completion	.800	.806	9

3.10 Data Processing and Analysis

Data analysis methods depend on the research design used, nature of data collected and measurement methods. This study is a descriptive survey and hence, descriptive data analysis method will be suitable. The data collected were both quantitative and qualitative and therefore descriptive and inferential statistics was used to analyze the data. Quantitative data was analyzed using descriptive statistics calculated as proportions, frequencies, and percentages. Correlation analysis was used to obtain the relationships between the variables under study. The Pearson correlation coefficient was used to show the degree of relationship among the variables. Regression analysis was used to analyze the data to show the cause-effect relationship of the factors that influence project completion .The regression model is of the form given below

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where; Y = Project completion,α = Regression constant, $\beta_1, \beta_2, \beta_3 and\, \beta_4$ = Regression coefficient, ε = Error term while X_1, X_2, X_3 and X_4 are client-related factors, contractor related factors, consultant related factors and external factors respectively.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This Chapter presents the findings of the study under sub-sections in line with the study variables and objectives. The thematic areas include study demographics, client related factors, contractor related factors, consultant related factors, and external factors.

4.2 Response Rate

Out of the 90 questionnaires administered, 74 respondents returned them. This represents 82% response rate.

4.3 Demographic characteristics

4.3. 1. Gender Distribution

Table 4.1: Gender of Respondents

	Frequency	Percent	Valid Percent
Male	49	66.2	66.2
Female	25	33.8	33.8
Total	74	100.0	100.0

From Table 4.1, the sample of respondent included 49 male and 25 female respondents; this revealed that 66.2% of the respondents were male while 33.8% of the respondents were female. More male respondents participated in the study than females.

4.3.2 Age of Respondents

From Table 4.2, most of the operatives were aged between 21 to 30 years.

Table 4.2: Age of Respondents

Category	Frequency	Percent	Valid Percent
21-30 yrs	45	60.8	60.8
31-40 yrs	16	21.6	21.6
41-50 yrs	11	14.9	14.9
over 50 yrs	2	2.7	2.7
Total	74	100.0	100.0

4.3.3 Education level

From Table 4.3, the majority of the respondents were certificate holders, followed by diploma holders.

Table 4.3: Education Level of Respondents

Level	Frequency	Percent	Valid Percent
Certificate	52	70.3	70.3
Diploma	17	23.0	23.0
Higher Diploma	4	5.4	5.4
Bachelors	1	1.4	1.4
Total	74	100.0	100.0

4.3.4 Experience

The experience of the respondents showed that 39.2% of the respondents had experience of between 6 to 10 years, 35.1% at 0 to 5 years, 13.5% were 11to 15 years, 6.8% were 16 to 20 years, and 5.4% above 20 years. This indicated that the majority of the respondents had experience of between 6 to 10 years and therefore had sufficient knowledge of project activities

4.4 Client related factors affecting Project Completion

4.4.1 Client Financial Capacity

On the question as to whether the client promptly makes payment to the contractor, which is an indicator of his financial capacity, 51.4% of the respondents strongly disagreed and 28.4% disagreed as indicated in Table 4.4. This therefore implied that majority of respondents (79.8%) agreed that the client does not pay the contractor promptly.

Table 4.4: Client payment promptness

	Frequency	Percent	Valid Percent
strongly disagree	38	51.4	51.4
Disagree	21	28.4	28.4
Neutral	6	8.1	8.1
Agree	7	9.5	9.5
strongly agree	2	2.7	2.7
Total	74	100.0	100.0

4.4.2 Imposition of Contract duration

In response to the question as to whether the client influences the duration of the contract, 25.7% strongly disagreed and 48.6% agreed that the client influences project duration.

Table 4.5: Client influence on contract duration

	Frequency	Percent	Valid Percent
strongly disagree	6	8.1	8.1
Disagree	10	13.5	13.5
Neutral	3	4.1	4.1
Agree	36	48.6	48.6
strongly agree	19	25.7	25.7
Total	74	100.0	100.0

4.4.2 Client Decision-making ability

The time taken by the client to approve design documents and variation orders is a measure of his decision-making ability. In response to the question as to whether the client promptly approves design documents, 54.1% of the respondents and 18.9 strongly disagreed. It, therefore, imply that majority of the respondents were of the view that the client does not approve design documents in time.

Table 4.6: Client timely approval of Design Documents

	Frequency	Percent	Valid Percent
strongly disagree	14	18.9	18.9
Disagree	40	54.1	54.1
Neutral	3	4.1	4.1
Agree	9	12.2	12.2
strongly agree	8	10.8	10.8
Total	74	100.0	100.0

In response to the question as whether the client promptly approved variation orders, 54.1% of the respondents and 16.2 strongly disagreed. It, therefore, imply that majority of the respondents were of the view that the client does not variation orders in time.

Table 4.7: client timely approval of variation orders

	Frequency	Percent	Valid Percent
strongly disagree	12	16.2	16.2
Disagree	40	54.1	54.1
Neutral	7	9.5	9.5
Agree	9	12.2	12.2
strongly agree	6	8.1	8.1
Total	74	100.0	100.0

4.4.4 Client variation in scope

In response to the question as to whether the client usually changes the scope of work, 32.4% strongly agreed and 48.6% agreed. Therefore, it can be interpreted that majority of the respondents were of the view that the client change scope of the work.

Table 4.8: Client variation in Scope

	Frequency	Percent	Valid Percent
strongly disagree	5	6.8	6.8
Disagree	6	8.1	8.1
Neutral	3	4.1	4.1
Agree	36	48.6	48.6
strongly agree	24	32.4	32.4
Total	74	100.0	100.0

4.4.5 Owner Interference

The client (owner) can interfere with the work of the contractor through the selection of workers and suspension of work during contract implementation. In response to the question as to if the client involvement in work selection force, 29.7% and 16.2 % strongly agree and agree respectively while 16.2 % strongly disagreed and 24.3 %

disagreed. This, therefore, shows about 46% agree that the client interferes with the contractor's choice of his personnel.

Table 4.9: Client involvement in choice of workforce

	Frequency	Percent	Valid Percent
strongly disagree	12	16.2	16.2
Disagree	18	24.3	24.3
Neutral	10	13.5	13.5
Agree	22	29.7	29.7
strongly agree	12	16.2	16.2
Total	74	100.0	100.0

On the question as to whether the client suspends work done without his consent, 58.1% agreed and a further 25.7% strongly agreed.

Table 4.10: client suspension of work

	Frequency	Percent	Valid Percent
strongly disagree	5	6.8	6.8
Disagree	3	4.1	4.1
Neutral	4	5.4	5.4
Agree	43	58.1	58.1
strongly agree	19	25.7	25.7
Total	74	100.0	100.0

4.5 Contractor related factors affecting project completion

4.5.1 Contractor financial capacity

The ability to finance a large percentage of the project work without relying on the client to provide the funds can be a measure of contractor financial capacity. In

response to the question as to if the contractor has enough funds to finance the project, 47% disagreed while 39% strongly disagreed implying that majority of respondents were of the view that the contractor had inadequate funds to finance the project without requesting from funds from the owner.

Table 4.11: Contractor financial capacity

	Frequency	Percent	Valid Percent
strongly disagree	29	39.2	39.2
Disagree	35	47.3	47.3
Neutral	6	8.1	8.1
Agree	1	1.4	1.4
strongly agree	3	4.1	4.1
Total	74	100.0	100.0

4.5.2 Contractor Personnel

The use of skilled personnel by the contractor minimizes construction mistakes and errors and thus lead to quality work. The respondents were required to answer whether the contractor had skilled personnel and 45.9% disagreed that the contractor had the skilled personnel and 16.2 % strongly disagreed, 31% agreed while 4% strongly agreed that the contractor had the skilled workforce. This concurs with the response on education level where the majority were certificate holders.

Table 4.12: Contractor personnel

	Frequency	Percent	Valid Percent
strongly disagree	12	16.2	16.2
Disagree	34	45.9	45.9
Neutral	2	2.7	2.7
Agree	23	31.1	31.1
strongly agree	3	4.1	4.1
Total	74	100.0	100.0

4.5.3 Equipment Availability

Construction projects require machinery and therefore the availability of equipment in quantity and quality can influence the ability of the contractor to finish the work in time. From Table 4.13, 44.6% of the respondents disagreed and a further 25.7% strongly disagreed to the question as to whether the contractor had adequate equipment. This meant that the contractor had inadequate equipment and therefore the contractor's ability to finish the work in time is unlikely. In addition, when the contractor has inadequate equipment and relies on hired machinery, then the cost of the project might increase.

Table 4.13: Equipment adequacy

	Frequency	Percent	Valid Percent
strongly disagree	19	25.7	25.7
Disagree	33	44.6	44.6
Neutral	4	5.4	5.4
Agree	13	17.6	17.6
strongly agree	5	6.8	6.8
Total	74	100.0	100.0

Construction machinery of poor quality has a higher chance of failure and therefore increasing the time required to complete the project tasks and cost of maintenance thereby increasing overall project cost and, in some occasions, poor quality work. In response to the question as to whether the contractor had equipment of the right quality (Table 4.14), 51.4% of the respondents disagreed while 23% strongly disagreed which indicated that the contractor's capability to finish the project within set duration is deficient.

Table 4.14: Equipment quality

	Frequency	Percent	Valid Percent
strongly disagree	17	23.0	23.0
Disagree	38	51.4	51.4
Neutral	6	8.1	8.1
Agree	12	16.2	16.2
strongly agree	1	1.4	1.4
Total	74	100.0	100.0

4.5.4 Control over subcontractors involved in the project

In response to the question as to if the contractor had control over subcontractors in the project, 63.5% disagreed while 5.4% strongly disagreed. This, therefore, implied that 69% of the respondents indicated that the contractor had no control over sub-contractors involved in the project. This hampered the ability of the contractor to control the rate of completion of specific tasks assigned to sub-contractors thus impeding project completion.

Table 4.15: Control over subcontractors

	Frequency	Percent	Valid Percent
strongly disagree	4	5.4	5.4
Disagree	47	63.5	63.5
Neutral	8	10.8	10.8
Agree	10	13.5	13.5
strongly agree	5	6.8	6.8
Total	74	100.0	100.0

4.5.5 Contractor has access to the material of right quality and quantity

In response to the question as to whether the contractor had access to material of the right quality and quantity, 43% and 15% agreed and strongly agreed respectively. Therefore, majority of the respondents agreed that the contractor had access to material of the right quantity and quality.

Table 4.16: Access to Material

	Frequency	Percent	Valid Percent
strongly disagree	1	1.4	1.4
Disagree	24	32.4	32.4
Neutral	6	8.1	8.1
Agree	32	43.2	43.2
strongly agree	11	14.9	14.9
Total	74	100.0	100.0

4.5.6 Site supervision ability

The ability of the contractor to supervise and co-ordinate project activities and tasks largely affect the project completion. In response to the question as to whether the contractor had the capacity to supervise project activities, 39.2% agreed while 12.2%

strongly agreed. On the other hand, 29.7% disagreed while 5.4% strongly disagreed. Therefore, the majority agreed that the contractor had the capacity to supervise project work.

Table 4.17: Site supervision ability

	Frequency	Percent	Valid Percent
strongly disagree	4	5.4	5.4
Disagree	22	29.7	29.7
Neutral	10	13.5	13.5
Agree	29	39.2	39.2
strongly agree	9	12.2	12.2
Total	74	100.0	100.0

4.6 Consultant related factors influencing project completion

4.6.1 Consultant's experience

The experience of the consultant to undertake project work is important in the completion of projects. An experienced consultant can detect errors and mistakes in design documents and has better co-ordination of project activities and communication to the various parties (contractor and Client and sub- contractor). The respondents were required to answer whether the consultant had experience in the project, 45.9%, and 24.3% agreed and strongly agreed respectively. This implied that a majority of respondents (about 70%) agreed that the consultant had the experience to undertake the work.

Table 4.18: Experience of consultant

	Frequency	Percent	Valid Percent
strongly disagree	2	2.7	2.7
Disagree	6	8.1	8.1
Neutral	14	18.9	18.9
Agree	34	45.9	45.9
strongly agree	18	24.3	24.3
Total	74	100.0	100.0

4.6.2 Consultant's personnel

In response to the question as to whether the consultant has qualified personnel, 54% and 16% of the respondents agreed and strongly agreed respectively. This could be interpreted by the researcher that majority of the respondents agree that the consultant has qualified personnel to undertake the project.

Table 4.19: Consultant skilled personnel

	Frequency	Percent	Valid Percent
strongly disagree	1	1.4	1.4
Disagree	13	17.6	17.6
Neutral	8	10.8	10.8
Agree	40	54.1	54.1
strongly agree	12	16.2	16.2
Total	74	100.0	100.0

4.6.3 Consultant's supervisory ability

In response to the question as to whether the consultant has a good supervisory ability, 35.1 % of respondents agreed while 17.6% strongly agreed. This implied that about half agreed that the consultant had a good supervisory ability. This could be due to the absence of the consultant on site to supervise the project activities where 60.8% of the respondents disagreed that the consultant was on the project site for supervision as shown in Table 4.21.

Table 4.20: Consultant supervision ability

	Frequency	Percent	Valid Percent
strongly disagree	3	4.1	4.1
Disagree	23	31.1	31.1
Neutral	9	12.2	12.2
Agree	26	35.1	35.1
strongly agree	13	17.6	17.6
Total	74	100.0	100.0

Table 4.21: Consultant presence on site for supervision

	Frequency	Percent	Valid Percent
Disagree	45	60.8	60.8
Neutral	4	5.4	5.4
Agree	23	31.1	31.1
strongly agree	2	2.7	2.7
Total	74	100.0	100.0

4.6.4 Consultant's co-ordination ability

The ability of the consultant communicate the correct information to the contractor and client is important in project completion. About 2.7% of the respondents strongly agreed while 40.5% disagreed that the consultant communicated the correct information on time. This could be interpreted by the researcher that majority of the respondents disagree that the consultant communicates information on a timely basis to the client and contractor. This, therefore, means that the consultant could not effectively coordinate project activities.

Table 4.22: Consultant co-ordination ability

	Frequency	Percent	Valid Percent
strongly disagree	2	2.7	2.7
Disagree	30	40.5	40.5
Neutral	14	18.9	18.9
Agree	21	28.4	28.4
strongly agree	7	9.5	9.5
Total	74	100.0	100.0

4.6.5 Consultant's decision-making ability

The ability of the consultant to approve design drawings and sample materials on time was a measure of his decision-making ability.

In response to the question as to whether the consultant approves design drawings and sample materials, 4% strongly disagreed and 50% disagreed that the consultant timely approves design drawings and sample material on time. This could be interpreted by the researcher that majority of the respondents disagree that the consultant timely approves design drawings and sample materials.

Table 4.23: Consultant timely approval of design documents

	Frequency	Percent	Valid Percent
strongly disagree	3	4.1	4.1
Disagree	37	50.0	50.0
Neutral	7	9.5	9.5
Agree	17	23.0	23.0
strongly agree	10	13.5	13.5
Total	74	100.0	100.0

4.7 External factors influencing project completion

4.7.1 Political interference in the project

In response to the question as to whether there was political interference in the project, 55.4% agreed while 23% strongly agreed that there existed political interference on the project.

Table 4.24: Political interference

	Frequency	Percent	Valid Percent
strongly disagree	2	2.7	2.7
Disagree	5	6.8	6.8
Neutral	9	12.2	12.2
Agree	41	55.4	55.4
strongly agree	17	23.0	23.0
Total	74	100.0	100.0

4.7.2 Taxation measures by the government

In response to the question as to whether there were favourable taxation measures, 28.4% strongly disagreed while 54.1% disagreed.

Table 4.25: Taxation measures

	Frequency	Percent	Valid Percent
strongly disagree	21	28.4	28.4
Disagree	40	54.1	54.1
Neutral	10	13.5	13.5
Agree	1	1.4	1.4
strongly agree	2	2.7	2.7
Total	74	100.0	100.0

4.7.3 Industrial action

Industrial disputes and employee unrest can affect completion of projects. 35.1% of the respondents agreed that there was no industrial action and unrest from the employees involved in the project. A further 10.8% strongly agreed which implied that majority of the respondents agree that there is no industrial strike from employees.

Table 4.26: Industrial action and unrest

	Frequency	Percent	Valid Percent
strongly disagree	5	6.8	6.8
Disagree	16	21.6	21.6
Neutral	19	25.7	25.7
Agree	26	35.1	35.1
strongly agree	8	10.8	10.8
Total	74	100.0	100.0

4.7.4 Unavailability of materials in the local market.

In response to the question as to whether the contractor has easy access to materials outside the country, 18.9% and 51.4% strongly agreed and agreed respectively. Lack

of easy access to materials outside the country could have an influence on the completion time of projects.

Table 4.27: Access to materials outside the country

	Frequency	Percent	Valid Percent
strongly disagree	14	18.9	18.9
Disagree	38	51.4	51.4
Neutral	21	28.4	28.4
strongly agree	1	1.4	1.4
Total	74	100.0	100.0

4.6.5 Regulation

Licensing procedures have an influence on project completion time and cost. In response to the question as to if there were no bureaucratic licensing procedures, 33.8% strongly disagreed while 55.4% agreed. Therefore, a majority of respondents (89%) were of the view that there were bureaucratic licensing procedures.

Table 4.28: Licensing procedures

	Frequency	Percent	Valid Percent
strongly disagree	25	33.8	33.8
Disagree	41	55.4	55.4
Neutral	6	8.1	8.1
Agree	1	1.4	1.4
strongly agree	1	1.4	1.4
Total	74	100.0	100.0

4.8 Correlation Analysis

Correlation analysis helps to establish the relationship between the dependent variable (project completion) and independent variables. This study employed Pearson correlation.

4.8.1 Relationship between client related factors and project completion

The table 4.29 illustrates the relationship between the client related factors and completion time variables

Table 4.29: Correlation Client Related factors and project completion

		Client related	Project Completion
Client Related	Pearson Correlation	1	.302*
	Sig. (2-tailed)		.009
	N	74	74

*. Correlation is significant at the 0.05 level (2-tailed).

The client-related factors considered in this study included financial capacity, the imposition of contract duration, owner interference, decision-making ability and scope variation. From table 4.29, there is a positive relationship of client related factors with project completion ($r = 0.302$, $p < 0.05$). This was statistically significant at 95% confidence level. This concurred with a similar study by Ndungu (2014) who found client's financial ability in terms of payments in time as the most important factor influencing project completion. The main role of a client is to provide the financial requirements of the project and therefore, his ability to mobilize resources is significant to successful completion of the project. Slow decision making in terms of delay in approving variation orders, owner interference and imposition of unrealistic contract duration also influenced project completion as found by Sambasivan and Soon (2007).

4.8.2 Relationship between contractor related factors and project completion

The table 4.30 illustrates the relationship between the contractor related factors and completion time variables

Table 4.30: Correlation of contractor related factors and project completion

		Contractor Related	Project Completion
Contractor Related	Pearson Correlation	1	.668*
	Sig. (2-tailed)		.001
	N	74	74

*. Correlation is significant at the 0.05 level (2-tailed)

From Table 4.30 it can be deduced that contractor related factors had a strong and significant positive relationship with project completion ($r = 0.668$, $p < 0.05$). The contractor related factors considered were financial capacity, skilled personnel, equipment availability and quality, material availability, control over subcontractor and site supervision. This concurred with similar studies by Kamotho (2014), who found the financial capacity of the contractor and (Kikwasi, 2012), who found equipment failure besides financial capacity as one of the factors influencing project completion. Material access by the contractor, presence of sub-contractors, skilled personnel, and site supervision ability were among the contractor related factors that influenced project completion for construction projects according to a study by Sambasivan and Soon (2007). If the contractor does not have the adequate equipment then the option available is to hire which can affect negatively the project cost or its unavailability delays project completion time. Sub-contractors in a project are involved in various sub-tasks that could influence the quality, cost, and scope of the project if the contractor does not have control over them.

4.8.3 Relationship between consultant related factors and project completion

Table 4.31 indicate the relationship between consultant-related factors and project completion.

Table 4.31: Correlation of consultant related factors and project completion

		Consultant Related	Project Completion
Consultant Related	Pearson Correlation	1	.643*
	Sig. (2-tailed)		.001
	N	74	74

*. Correlation is significant at the 0.05 level (2-tailed)

From Table 4.31, consultant related factors had a significantly strong positive relationship with project completion ($r = 0.643$, $p < 0.05$). The consultant related factors considered in the study were, experience, personnel, supervisory ability, co-ordination ability and decision-making ability. This was in agreement with studies by Abd El-Razek et al. (2008) in Egypt and (Kaliba et al., 2009) in Zambia where poor co-ordination and poor supervision were the most important factors associated with the consultant that influence project completion. The decision-making ability of the consultant in terms of approval of design documents and sample materials to enable the contractor to proceed with construction had a significant impact on completion of the project. This was consistent with a study by Sambasivan and Soon (2007) where it was found that delayed approval of design documents was an important factor causing delays in construction projects. The main function of a consultant involves acting as a bridge between the client and the contractor and thus the ability to co-ordinate the project functions of the two parties influence the project completion time, which is one of the measures of project completion.

4.8.4 Relationship between External factors and project completion

Table 4.32 illustrates the relationship between external factors and project completion.

Table 4.32: Correlation of external factors and project completion

		External factors	Project Completion
External factors	Pearson Correlation	1	.312**
	Sig. (2-tailed)		.007
	N	74	74

**. Correlation is significant at the 0.05 level (2-tailed)

From Table 4.32, external factors considered in this study (political influence in projects, material unavailability in the market, regulation, industrial action and taxation measures) had a weak positive relationship with project completion ($r = 0.312$, $p < 0.05$). This concurred with a study by Muhwezi et al. (2014) who found material unavailability in the market and regulation (licensing and taxation measures) as the most important factors that influence project completion. (Kaliba et al., 2009) found industrial action as one of the important external factors influencing project completion.

4.9 Regression Analysis

This was carried out to establish the cause-effect relationship of the variables in the study.

4.9.1 Regression analysis of individual variables

As illustrated in Table 4.33, the coefficient of determination ($R^2 = 0.091$) which imply that client related factors contribute to 9.1 % of the variation in project completion. Although it is a small percentage, it is significant as indicated in table 4.34 by the level of significance of the probability F-test of 0.009 which is less than an alpha of 0.05 used in the study.

Table 4.33: Regression of client related factors and project completion

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.302[a]	.091	.078	.583

a. Predictors: (Constant), client

Table 4.34: ANOVA Results (Client related factors)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.449	1	2.449	7.205	.009[a]
	Residual	24.471	72	.340		
	Total	26.920	73			

a. Predictors: (Constant), client related

b. Dependent Variable: Project Completion

This results indicated in table 4.33 are similar to those found by Kimani and Michael (2015) where finance as a client factor contributed 15.1% of project completion.

Regression of contractor related factors as illustrated in Table 4.35 indicated that R^2 = 0.447 which showed that 44.7% of the variation in project completion is associated with contractor related factors. This was also significant as illustrated in Table 4.36. These results were consistent with those found by Ondari and Gekara (2013) where contractors contributed 47.6% of the influence on project completion. Ndungu (2014) found the contribution of the contractor to project completion time to be 35.6%

Table 4.35: Regression of contractor related factors and project completion

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.668[a]	.447	.439	.455

a. Predictors: (Constant), Contractor related

Table 4.36: ANOVA Results (Contractor Related factors)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.022	1	12.022	58.101	.000[a]
	Residual	14.898	72	.207		
	Total	26.920	73			

a. Predictors: (constant), contractor related, dependent Variable: Project Completion

Regression of consultant related factors as illustrated in Table 4.37 indicated that R^2 = 0.413 which showed that 41.3% of the variation in project completion is associated with consultant related factors. This was also significant as illustrated in Table 4.38. Van, Sang, and Viet (2015) found that consultant related factors contributed 54% towards project completion.

Table 4.37: Regression of consultant related factors and project completion

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.643[a]	.413	.405	.468

a. Predictors: (Constant), Consultant related

Table 4.38: ANOVA Results (Consultant Related factors)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.123	1	11.123	50.697	.000[a]
	Residual	15.797	72	.219		
	Total	26.920	73			

a. Predictors: (Constant), Consultant related factors

b. Dependent Variable: Project Completion

Regression of external factors as illustrated in Table 4.39 indicated that R^2 = 0.097 which showed that 9.7 % of the variation in project completion is associated with external factors. This was also significant as illustrated in Table 4.40

Table 4.39: Regression of external factors and project completion

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.312[a]	.097	.085	.581

a. Predictors: (Constant), External factors

Table 4.40: ANOVA Results (external factors)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.620	1	2.620	7.762	.007[a]
	Residual	24.300	72	.338		
	Total	26.920	73			

a. Predictors: (Constant), External factors

b. Dependent Variable: Project Completion

The results for external factors in this study was similar to those found by Kamau and Muturi where political interest as an external factor contributed 11.6% towards project completion. Similarly, a study of the effect of political factors which included stable political environment, government guarantees to developers, legal framework, provision of secure land, and government support for local building materials found that it contributed 19.3% towards successful completion of projects (Musa, Amirudin, Sofield, & Musa, 2015). In addition, (Van et al., 2015), found that external factors contributed 13.6% towards project completion.

4.9.2. Multiple Regression analysis

Table 4.41 shows that R^2 is 0.583. This showed that that the variation around the means in client factors, Consultant factors, Contractor factors and the external factors is about 58.3%. The remaining balance can be explained by other variables, which were not examined in this study. Table 4.42 shows that the level of significance of the probability F-test is 0.00. This value is lower than 0.05, as the level of alpha used in this study. This means that all variables used in this study, Client factors, Contractor factor, Consultant factor and external factors have some degrees of influence toward project completion.

Table 4.41: Regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.763[a]	.583	.559	.403

a. Predictors: (Constant), External , Consultant , client , Contractor related factors

Table 4.42: Overall ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.687	4	3.922	24.091	.000[a]
	Residual	11.232	69	.163		
	Total	26.920	73			

a. Predictors: (Constant), External , Consultant, client, Contractor related factors

b. Dependent Variable: Project Completion

Regression coefficient results are indicated in Table 4.43

Table 4.43: Regression coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.303	.436		-2.987	.004
	client	.126	.091	.113	1.388	.031
	Contractor	.403	.114	.360	3.540	.001
	Consultant	.367	.089	.398	4.120	.000
	External	.245	.118	.167	2.070	.042

a. Dependent Variable: Project Completion

From Table 4.43, all the factors are significant.

The regression model of the study is of the form

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where, y = project completion, α = regression coefficient, β = regression coefficient, x_1 = client related factors, x_2 = contractor related factors, x_3 = consultant related factors, x_4 = external factors and ε = error term

Ignoring the error term, the equation of the model would be

Project Completion =-1.303 + 0.126 CLIENT + 0.403 CONTRACTOR + 0.367 CONSULTANT+ 0.245 EXTERNAL

This means that all the factors considered in the study had a positive relationship with project completion. When all the factors (client related, contractor related, consultant related and external factors) are zero, influence on project completion will be -1.303. A unit increase in client related factors leads to a 0.126 increase in project completion while a unit increase in contractor related factors led to a 0.403 increase in project completion. Similarly, a unit increase in consultant related factors led to a 0.367 increase in project completion while, a unit increase in external factors led to a 0.245 increase in project completion. It can be deduced that the most important factors influencing completion are those related to contractor followed by consultant and external respectively. Client related factors had the least influence on project completion.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter presents a summary of study findings, conclusions drawn and recommendations based on the conclusions. The study sought to determine the factors influencing project completion of water projects in Kakamega County.

5.2 Summary of Findings

This study classified factors influencing project completion into client related, contractor related, consultant related and external factors.

5.2.1 Client related factors

The main factors that were associated with client included financial capacity, owner interference, and the imposition of contract duration, decision-making ability and change in project scope. Correlation analysis indicated that these factors had a weak but significant positive relationship with project completion ($r = 0.302$, $p < 0.05$). Regression analysis gave a coefficient of determination ($R^2 = 0.091$) which imply that client related factors contribute to 9.1% of the variation in project completion

5.2.2 Contractor related factors

The contractor related factors studied were financial capacity, equipment availability, and quality, skilled workforce, site management ability, material availability and control over sub-contractors. These factors had a strong and significant positive relationship with project completion ($r = 0.668$, $p < 0.05$). Regression of contractor related factors gave $R^2 = 0.447$ which showed that 44.7% of the variation in project completion is associated with contractor related factors

5.2.3 Consultant related factors

The study sought to determine the effect of consultant related factors on project completion. The factors considered included experience, skilled personnel, co-ordination, site supervision and decision-making ability. These factors had a significantly strong positive relationship with project completion ($r = 0.643$, $p < 0.05$). Regression of consultant related factors gave $R^2 = 0.413$ which showed that 41.3% of the variation in project completion is associated with consultant related factors.

5.2.4 External factors

External factors studied were political interference, industrial action, regulation, taxation, and material unavailability in the market. These factors had a weak but significant positive relationship ($r = 0.312$, $p < 0.05$) with project completion. Regression of external factors gave $R^2 = 0.097$ which showed that 9.7 % of the variation in project completion. The overall regression model gave R^2 of 0.583. This showed that that the variations around the means in client factors, Consultant factors, Contractor factors and the external factors is about 58.3%. The remaining balance can be explained by other variables, which were not examined in this study. The most important factors influencing project completion were the contractor, consultant, external and client related factors respectively.

5.3 Conclusions

The following conclusion can be drawn from the study.

Client related factors had a significant positive relationship with project completion. 9.1% of the variation in project completion can be attributed to the factors associated with the client.

Contractor related factors had a statistically significant positive relationship with project completion. From regression analysis, 44.7% of the variation in project completion can be attributed to contractor related factors.

Consultant related factors had a statistically significant positive relationship with project completion. 41.3% of the variation in project completion can be attributed to

consultant related factors. External factors had a statistically significant positive relationship with project completion accounting for 9.7% for its variation.

5.4 Recommendations

The following recommendations can be made from the findings of the study.

Clients should ensure there are enough funds to finance the project without delaying any payment to the contractor.

Contractors selected for any construction project should have enough financial capacity and adequate equipment of the right quality and should have some control over sub-contractors. This would ensure the project is completed within budget, time and meet client specifications. Consultants should be present on site to supervise project activities an also communicate effectively any information including variation orders, design documents, and sample materials to the client and contractor promptly.

5.5 Recommendations for further Research

The following are the suggestions for further research

a) The effect of the contract types employed in the project on project completion
b) The effect of unforeseen site conditions on project completion
c) The effect of human resources management practices on project completion
d) The effect of planning tools on project completion

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APPENDICES

APPENDIX A: LETTER OF INTRODUCTION

Edwin Kanda

P.O Box 190 – 50100,

Kakamega,

Dear Respondent,

RE: REQUEST TO RESPOND TO THE STUDY QUESTIONNAIRE

I am a student at Jomo Kenyatta University of Agriculture and Technology, Kakamega Campus pursuing a Master of Science Degree in Project Management. As part of this course requirement, I am expected to carry out a research on **Factors Influencing Completion of water projects in Kakamega County.** I therefore, humbly request for your assistance and cooperation in responding to the questions attached herewith. The information given will be treated with utmost confidentiality and will be used only for the purpose of the study.

Looking forward for your response and cooperation

Yours faithfully,

Edwin Kanda

APPENDIX B: QUESTIONNAIRE

Section A: General Information

1. Gender Male [ ] Female [ ]

2. Age

< 20 years [ ] 21 – 30 years [ ] 31 – 40 years [ ] 41 – 50 years [ ]

Over 50 years [ ]

3. How many years have you worked in the construction projects?

< 5 years [ ] 6 – 10 years [ ] 11 – 15 years [ ] 16 – 20 years [ ]

Over 20 years [ ]

4. What are your academic qualifications?

Certificate [ ] Diploma [ ] Higher Diploma [ ] Bachelors [ ] PGD [ ] Masters [ ] PhD [ ]

Section B: Factors influencing project completion

This section seeks to determine the factors that affect the completion of construction projects. On basis of the project you are involved in, you are kindly requested to indicate your level of agreement with each of the following project variables on 1 to 5 point Likert scale (1=strongly disagree, 2=Disagree, 3=Neutral , 4=Agree and 5=strongly Agree).

I. Client Related Factors

		1	2	3	4	5
1	The client promptly makes payment to the contractor for the work done					
2	The client usually inspects work completed before payment					
3	The client provides material for the project					
4	The client influences the duration of the contract					
5	The client is involved in the choice of material to be used in the project					
6	The client gets involved in the selection of work force involved in the project					

7	The client promptly approves design documents					
8	The client timely approves variation orders for the project					
9	The client at times suspends work done without his approval					
10	The client usually change the scope of work during project implementation					

II. Contractor Related Factors

		1	**2**	**3**	**4**	**5**
1	The contractor has enough funds to finance the project without waiting for the client					
2	The contractor has the right skilled work force suitable for the project					
3	The contractor has adequate equipment for the project					
4	The contractor has quality equipment for the contract work					
5	The contractor uses current technology and methods in the construction work					
6	The contractor has the capacity to plan and schedule the work as per the contract					
7	The contractor has access to the material of right quality and quantity					
8	The contractor has good will from suppliers who are ready to advance material on credit					
9	The contractor has control over subcontractors involved in the project					
10	The contractor has the capacity to supervise project activities					

III. Consultant Related Factors

SN	Statement	1	2	3	4	5
1	The consultant has the experience required to undertake the project					
2	The consultant has qualified personnel to undertake the project work					
3	The consultant is usually at the project site to oversee and supervise the project work					
4	The consultant understands the design specification of the project					
5	The consultant communicates the right/correct information on timely basis to the client and contractor					
6	The consultant has the capability to detect mistakes and discrepancies in the design documents					
7	The consultant timely approves design drawings and sample materials					
8	The consultant has shown good supervisory ability					

IV. External Factors

		1	2	3	4	5
1	There is usually political interference in the project					
2	The local leaders have developed interest in the project					
3	The employees involved in the project are satisfied in terms of working conditions and remuneration					
4	The contractor has easy access to materials outside the country					

5	The taxation measures by the government is favourable for the project work					
6	There are no bureaucratic licensing procedures for the contractor to undertake the project work					
7	There has not been industrial strike and unrest from employees of the project					

Section C. Project Completion

Based on your experience associated with the current construction, you are kindly requested to indicate your level of agreement with each of the following project completion measurement variables on 1 to 5 point Likert scale (1=strongly disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=strongly Agree).

		1	**2**	**3**	**4**	**5**
1	The client is satisfied with the quality of work done by the contractor					
2	The construction is completed as per the client's expected duration or within scheduled time					
3	The employees of the contractor, consultant and client are satisfied with the quality of work					
4	On completion the project cost was within budget or is within the planned budget					
5	There has been no delays in the completion of the project					
6	The payments for the contract has been prompt					
7	The time allocation for the completion of the project has always been adequate					
8	Dispute resolution meetings were often held during project execution					
9	There was no incidences of project disruptions due to dispute on workmanship					