

# **FACTORS INFLUENCING SUCCESSFUL COMPLETION OF ROAD CONSTRUCTION PROJECTS IN KENYA: THE CASE OF KISUMU COUNTY**

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## **Abstract**

*In Kenya, most road construction projects are completed with cost overruns, out of quality, beyond completion time and out of scope. The specific objectives were; to assess how procurement process influences successful completion of road construction projects in Kisumu county and to determine how communication influences successful completion of road construction projects in Kisumu county. The research was conducted through a survey using self-administered structured questionnaires administered to the respondents. Data analysis involved cleaning, sorting and cording of raw data and processing for purposes of interpretation using SPSS and Microsoft Office Excel. The study collected both quantitative and qualitative data therefore descriptive and inferential statistics was used to analyze the data. The findings were presented in tabular format, and there is a strong correlation between procurement process, communication, and successful completion of road projects. In conclusion, Procurement process and communication affects successful completion of road projects. Correlation studies show that the positive relationship with successful completion is more with both Procurement process and communication. It is recommended that these factors be addressed comprehensively and exhaustively during planning and construction supervision.*

*Keywords: Success, Procurement, Risk, Financing, Communication*

## INTRODUCTION

Construction project completion is affected by many factors. Every investor wants to be sure of the project scope, quality, time and cost. This is because challenges that affect project successful completion have far reaching effects, ultimately on the owner's interest. Globally, a research carried in USA showed that in the current economic landscape, project owners are scaling down or eliminating capital construction projects due to lack of financing, uncertainty over costs, poor management and concerns about potential delays that could impact the feasibility basis of project (Chism and Armstrong, 2010).

In a study carried out in Australia by McNair in 2011, the importance of a contractor delivering a complete road facility for a guaranteed price and by a guaranteed date has been advanced. It must also be performed to a specified level. It must too be performed to specified standard. It has been observed that failure to achieve this will usually result in a contractor incurring monetary losses.

In the UK a study carried out by Fapohunda and Stephen in 2010, states that in construction, conflicts exist between the projects stated objectives with regard to the appropriateness of cost, time and quality. They identified the distinct knowledge management areas for project manager's efficient performance to include among others project cost management which includes to provide an effective project schedule for project delivery besides actually delivering the project on the schedule (Fapohunda and Stephen 2010).

Regionally, in Sudan a study carried out by Omran, Abdalrahman and Pakir in 2012, to examine road construction projects performance revealed that despite large number of reported cases, construction ranging from the simplest to more complex projects have increasingly experienced cost overruns (Omran, Abdalrahman and Pakir, 2012). In Ghana studies reveal increasing cost overruns, delays in completion, unsatisfactory and unmet project objectives in most road construction projects (Gaba, 2013). In south Africa, studies reveal that client, project team do not have comprehensive understanding of road project from inception to completion (Olatunji, 2010). In Nigeria, road construction delay has become endemic .They therefore advance the need to create awareness of the extent to which delays adversely affect road project delivery. Delay they found out had significant impact on cost and time of execution of projects studied (Aibinu and Jagboro, 2012).

Locally, in Kenya construction industry has been robust with a lot of roads and buildings being constructed. Foreign investors have shown a lot of interest to have a stake in Kenyan road construction industry. They consider Kenya as a business hub in East and Central Africa and a centre from which they can operate within Africa as a consequent, Nairobi and its environs has witnessed a boom in road construction projects. Other construction projects

include government, Private individuals, private companies, international businesses and institution sanctioned (Kenya facts and figures, Kenya National Bureau of statistics, 2012)

In Kisumu many road projects fail to be completed in time causing cost overruns. This can be seen in the various number of road projects which have not been completed on time. Even more are those road projects that are in the end finished but at an inflated budget and at a date later than agreed in the road project schedule. For example is the expansion of Kisumu International Airport Phase II(Road works) ,which was scheduled to be completed in Fifteen Months but ended up being completed in twenty five months and experienced a lot of cost overruns due to change in scope and Price Variations. Besides, some road projects are completed but with very poor quality workmanship (Kenya Engineer Magazine, 2015).This research study therefore seeks to investigate the various factors that influence successful completion of road construction projects in Kisumu County

### **Statement of the Problem**

Generally, the successful measure of a project is defined by completing it within specified cost, time, scope and quality. Nwachukwu et al (2010), termed a road project to be successfully completed if it passed four success test criteria i.e. the time criterion – completed on time; the cost or money 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.

However, the road construction industry is full of projects that are completed with significant cost, scope and time deviation (Amhed, Zahara & Juma, 2010). The need for successful completion of road construction projects arises from the desire for the project to start serving its intended use and thus recouping the investment ploughed in. In the event that this is not realized, various outcomes play into such a reality. For instance the cost of implementation will escalate and the capital will remain tied in such a project unutilized until it is completed. Project sponsors claim it will be a conservative estimate to state that approximately 50% of construction projects experience time overruns and approximately 63% of all information system encounter substantial budget overruns, with the value of overruns “typically between 40-200%”.Most road projects are eventually completed more or less to specification, although they are seldom on time and within budget (Olatunji, 2011).

When a road project is not completed according to the initial time plan, a delay occurs. A delay is a situation where by an act or an event extends the time required to perform the tasks under the contract (Sambasivan, 2007).It is postponement of the time from original estimated

completion time which might be caused by the contractor, owner or consultant as well as external factors (Koushki and Kartam, 2004). The major impact of delays is increase in project cost, which causes the drain in project contingency fund.

In Kenya for instance, a number of roads have been reported to have failed due to lack of Proper Technical supervision and management incompetence. Dualling of Nyamasaria-Kisian Road in Kisumu, 2016, showed bitumen bleeding defects soon after surface dressing. Expansion of Kisumu International Airport, Road works, 2015, which was earmarked to be completed in fifteen months, ended up being completed in twenty-five months and experienced a lot of cost overruns, the project therefore end up being unsuccessfully completed, (Kenya Engineer Magazine, 2015). To respond to these failures, most organizations have resorted to adopt and implement operations management strategies that have been seen to work elsewhere in as much as project construction management is concerned. However, this has not been successful (Salaheldin, 2008).

In Kenya, very limited research if any has been done in road Construction industry with none having been conducted in Kisumu County. This study aimed to bridge this gap by looking at the factors that affect successful completion of public road construction projects in Kenya, using Kisumu county as the case study.

Clearly, in construction industry there are factors that have affected successful completion of road construction projects. Many road construction projects have been affected by various challenges, greatly affecting their completion. It is a major concern for every stakeholder in a road project to understand these factors (Mochal, 2009). This research study therefore further, seeks to look at the factors that will affect or influence successful completion of public road construction projects, that stakeholders will need to address. It is hoped that in addressing these factors, the success in completion of road construction projects will greatly be enhanced.

### **Research Objectives**

The general objective of the study is to determine factors that influence successful completion of road construction projects, in Kisumu County, Kenya.

Specifically, the study is intended to:

- i. To assess how procurement process influences successful completion of road construction projects, in Kisumu County.
- ii. To determine how communication influences successful completion of road construction projects, in Kisumu County.

## Research Questions

The research questions of the study are:-

- i. How does procurement process influence successful completion of road construction projects, in Kisumu County?
- ii. How does communication influence successful completion of road construction projects, in Kisumu County?

## Significance of the study

The research conclusion and recommendations shall improve management knowledge and skill of road construction professionals. It shall be important in enriching literature and stimulating further research where gaps occur. The construction project managers, Engineers, quantity surveyors, and site agent shall benefit from this study by applying the project research findings. The findings shall ensure that road construction projects are managed and completed successfully without failure. Project donors shall also benefit from the research findings, as the research project shall help them gain knowledge of project management and consequently successful completion. Successful completion shall be as a result of applying the findings of the study in ensuring that the risks factors that may cause road project failure are mitigated or avoided altogether.

## Scope of the study

This study focused mainly on identifying factors that influence successful completion of road construction projects in Kenya, the case of Kisumu County. The target population involved Engineers, Technical staff, Surveyors, Client, Project Managers and Site Managers from different road Authorities in Kisumu county. It focused on professionals involved in construction of road construction projects.

## Limitation of the study

The study was faced with lack of sufficient budget for carrying out the research project. The unavailability of adequate funds impacted negatively on the research project. On the other hand, time was a constraint that impacted negatively on the study.

## Definition of significant terms

**Project cost.** Project cost is the total project cost which includes design fees, material costs, construction costs, permit fees, land, furnishings, financing and all other costs that are incurred in completing a project (McDough, 2013).

**Product quality.** It is the ability of a product to fulfill customer's needs and expectations. Customers get value for their money or investment.(Deming,1986)

**Project schedule.** Project schedule is a tool that communicates what work needs to be performed, which resources of an organization will perform the work and timeframes in which that work needs to be performed. Project schedule should reflect all of the work associated with delivering the project on time (Guda, 2013).

**Project scope.** The work that needs to be accomplished to deliver a product, service or result with specified features and functions. It involves determining and documenting a list of specific project goals, deliverables, tasks, costs and deadlines. It defines project boundaries (Rouse, 2015)

**Public projects.** Public projects generally refer to construction projects funded by the county government or National Government. The projects are executed or supervised at the county level by Engineers and Technical staff from National Government or Authority or County Government (Kenya Engineer Magazine, 2015).

**Successful completion.** A project is successfully completed when completed within budgeted cost, with schedule, planned scope and executed to the required quality, specifications or standards (McNair, 2011).

## LITERATURE REVIEW

### Theoretical Framework

This study is guided by the theory of projects, theory of project management, stakeholder theory, communication theory, procurement theory and risk management theory.

### *Theory of Project*

The theory of project is provided by the transformation view on operations. In the transformation view, a project is conceptualized as a transformation of inputs to outputs, (Koskela and Howell 2002). There are a number of principles, by means of which a project is managed. These principles suggest, for example, decomposing the total transformation hierarchically into smaller transformations, tasks, and minimizing the cost of each task independently. We contend that understanding of management is based on three theories: management-as-planning, the

dispatching model and the thermostat model. In management-as-planning, management at the operations level is seen to consist of the creation, revision and implementation of plans. This approach to management views a strong causal connection between the actions of management and outcomes of the organization (Koskela and Howell 2002).

The dispatching model assumes that planned tasks can be executed by a notification of the start of the task to the executor. The thermostat model is the cybernetic model of management control that consists of the following elements: there is a standard of performance; performance is measured at the output; the possible variance between the standard and the measured value is used for correcting the process so that the standard can be reached (Koskela and Howell 2002).

### ***Theory of Project Management***

The theory of project management is divided into three theories: Theory of project planning, theory of project execution and theory of project control. The concept behind theory of planning is that there is a managerial part and an effector part in the project; the primary function of the managerial part is planning, and the primary function of the effector part is to translate the resultant plan into action.

There are two Principles of project planning theory. That is knowing the current state of the world, the desired goal state, and the allowable transformations of state, that can be achieved by actions, a series of actions, the plan can be deduced. Then the plan is translated into reality by the effector part of the organization. The theory assumes that translating a plan into action is a simple process accomplished by following directions. It also assumes that the internal planning of a task is a matter of the person to whom the task has been assigned, (Koskela and Howell 2002).

The concept behind the theory of execution is that, managerially, execution is about dispatching tasks to work stations. The principle behind this theory is that when, according to the plan, the time has arrived to begin task execution, it is authorized to start, in speech or in writing. It assumes that, the inputs to the task and the resources to execute it are ready at the time of authorization and that the task is fully understood, started and completed according to the plan once authorized, (Koskela and Howell 2002).

The theory of project control concept is that there is a process to be controlled, a unit for performance measurement, a standard of performance and a controlling unit (thermostat control). Project cost, project quality, project scope and time have to be controlled. The principle behind the theory is that, the possible variance between the standard and the measured value is used for correcting the process so that the standard can be reached. Its assumptions are that

the process is continuous flow type, the performance of which is measured at aggregate terms. It also assumes that the process can easily be corrected by the control available, (Koskela and Howell 2002).

### ***Stakeholder Theory***

In the stakeholder theory, the idea is that 'holders' who have 'stakes' interact with the organization and thus make its operation possible (Blair 1998) et al. It's a theory that explains how organizations function with respect to various constituencies with whom they are inextricably embedded. Stakeholder theory development has centered on defining the stakeholder concept and classifying stakeholders into categories that provide an understanding of individual stakeholder relationships.

Freeman's definition of stakeholder as any group or individual who can affect or who is affected by the achievement of the firm's objectives and continues to provide the boundaries of what constitutes a stake. He argues that a stakeholder has some form of capital, either financial or human, at risk and, therefore, has something to lose or gain depending on a firm's behaviour. To these elements, Waddock (2002) adds a tie or tether that creates a bond of some sort. A stakeholder theory of the organisation requires an understanding of the types of stakeholder influence but also how organisations respond to those influences. Each firm faces a different set of stakeholders, which aggregate into unique patterns of influence. Ambler and Wilson (1995) demonstrate that firms do not simply respond to each stakeholder individually; they respond, rather, to the interaction of multiple influences from the entire stakeholder set.

### ***Communication Theory***

Communication theories that can improve an individual's management skills, especially when interacting with team members include diffusion theory, group think theory, Social Information Processing Theory and Communication Accommodation Theory. Diffusion theory states that Humans are creatures of habits, and this is emphasized in the theory. It's difficult to change how individuals change their habits or their choice of thinking in an instant. Some individuals can easily adapt to changes while others will take time to adjust. Project managers should keep this theory in mind during the planning stage. Sudden changes in plans can disorient some team members, causing them to not function as properly as usual. Thus, plans need to be concrete and thorough to avoid disorientation among team. But when you're aware of the Diffusion Theory, you can come up with ways to make transitions effective for most, if not all, member, (Prescott 2013).



Group think theory is a type of communication theory whereby to achieve maximum results, a group needs to have one mind. That's the idea behind the Group think theory. The group members need to have the same goals, and there must be a unity in the decision-making. It will be difficult to achieve Groupthink since the cohesiveness within the members has to be high. As a project manager, you need to find a common ground with all the members to make sure that you're all aiming for the same thing. Most importantly, the team members must feel that they're part of the group that achieving the project goals is far more important than their personal differences. However, side effects occur in Groupthink and it's best to be prepared for that as well (Prescott 2013).

The other type of communication theory is social information processing theory. In this theory, many individuals are quick to dismiss the effectiveness of online communication, but the Social Information Processing Theory emphasizes how online relationships can be as strong as face-to-face ones. This interpersonal communication theory points out how strong bonds can be formed through the very few clues individuals can get from online conversations. This is important in this age where email correspondences sometimes happen more often than in-person conversations. It's also inevitable to send group messages within the team to quickly disperse instructions and information. To keep in mind that online relationships also matter, project managers will put more care with their words and on how to properly relay a message despite the lack of social context clues, (Prescott 2013).

Communication accommodation theory argues that an individual adapts to the person they're communicating with. When they interact with others, an individual tries to accommodate others by changing speech patterns, body language and gestures. As project managers, it's your duty to communicate well with your team members and communication accommodation theory can help you understand how and why. However, try to avoid over accommodation that can happen in fits not just in the communication field that project managers can use theories for their own personal development. As leaders, they need to constantly find ways to improve and develop. Adapting to different schools of knowledge is one way to do that our ways: overdoing, sensory, dependency and intergroup accommodation, (Prescott 2013).

### **Conceptual Framework.**

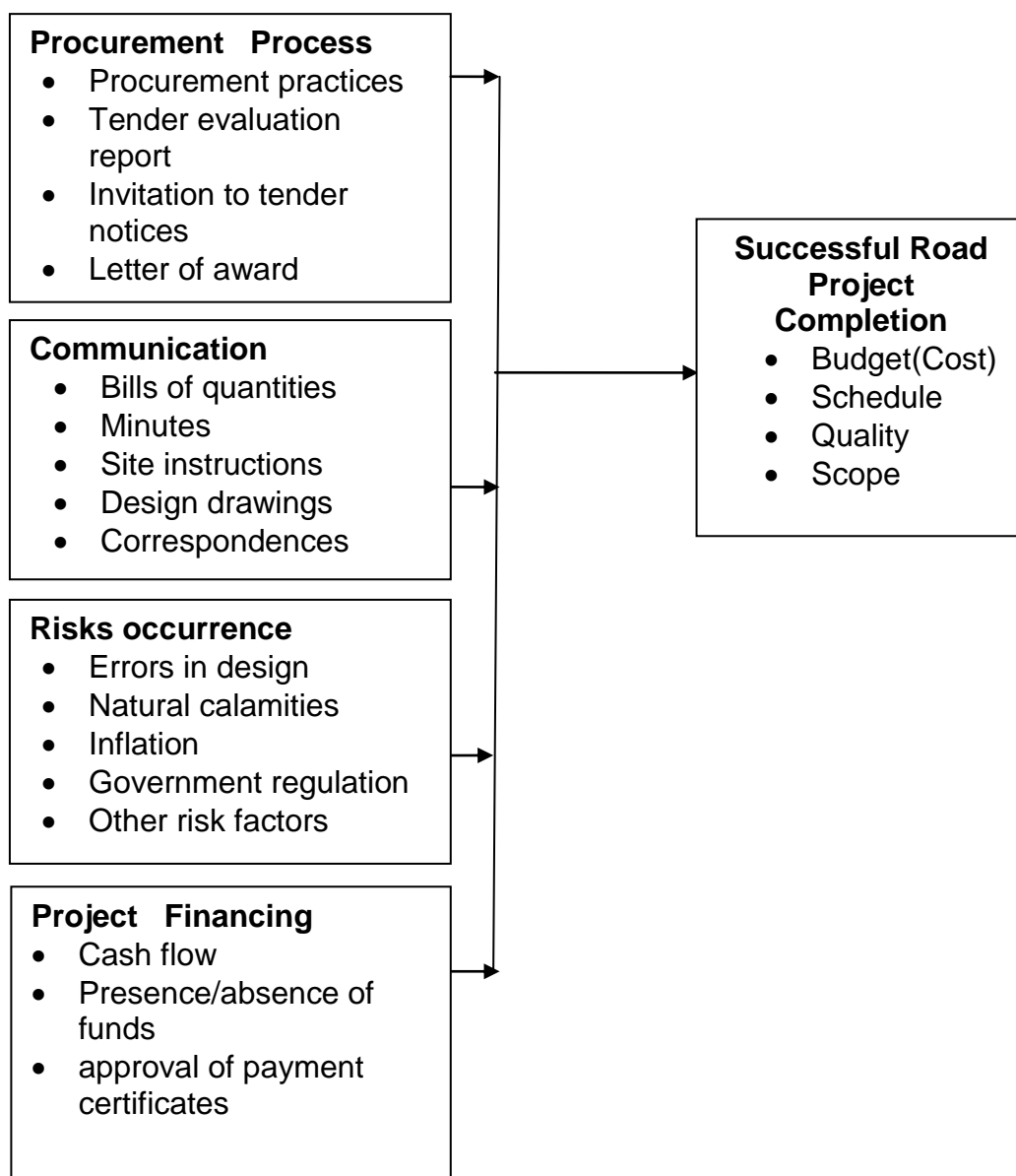
The conceptual framework illustrates the causal relationship between the independent variable and the dependent variable. This is illustrated in the Figure 1.

Successful completion of road construction project is dependent on independent variables. Road Construction projects are considered completed successfully when executed within scope, schedule, budget and quality. When any of the independent variables fail, then

there is a higher likely would that the dependent variables will also fail. This research seeks to justify these. It is therefore imperative to ensure that the independent variables are done to the satisfaction of all stakeholders, consequently ensuring road project successful completion.

In this research the independent variables which constitute project objectives, include Procurement process, communication, risk occurrence and project financing, Intervening variables identified include Economic policies, Project Manager's competence, experience of project team and project Planning.

Figure 1: Conceptual framework



## **Procurement Process and successful completion of road construction project**

The procurement of construction project is vast in scope because it involves the gathering and organization of myriads of separate individuals, firms and companies to design, manage and build construction products such as houses, office buildings, shopping complex, roads, bridges etc for clients or customers. Procurement come the word procure which literally means to obtain by care or effort; to bring about and to acquire (Rosli et al.,2006). Procurement is the process of acquiring goods and services from another source for some consideration (Aqua Group, 1999).Project procurement is an organizational structure needed to design and build construction projects for a specific client (Masterman, 1996).

It has been stressed that in today's highly competitive and uncertain business environment, clients are demanding for better value from their investment. They want their road project to be completed on time, within the estimated cost and with the right quality. The use of the various project procurement systems show that the construction industry is now trying to meet the client's needs. This is because the different procurement methods will have different effect on cost, time and quality of a project. Each project procurement system has its own peculiarity in terms of the pre-tender and the post tender activities and processes, division of risks between client and contractors, and effectiveness of project monitoring and control .It is very important at the very outset of the project to carefully consider all factors when selecting the most appropriate procurement approach for a road construction project. This is because each system has its own feature and peculiarity that will have effect on the cost, time and quality of the project i.e. have effect on the project performance (Rosli et al.,2006)

Tendering in road construction is the administrative procedure of sending out drawings, bills of quantities and specifications to contractors with the intention to submit a price for the construction of a project. Besides, the price of a road project, other considerations such as contractor's competence, financial capability, technical competence and other factors are used in selecting the most competitive contractor for executing a road construction project. The establishment of a procurement strategy that identifies and prioritizes key project objectives as well as reflects aspects of risk, and establishes how the process will be managed are keys to a successful project outcome (Al-Bahar and Crandall, 1990).

There are various methods such as open, selective, negotiation, design and build tendering approaches that have been used in road construction projects. In addition single and two stage tendering methods have been used significantly also in the construction industry (Ramus et al.,1981).The use of open tendering method involve placing an advertisement in a widely read Newspaper to invite prospective road contractors to tender and it is strongly criticized for its increased cost of processing (Mathonsi and Thawala,2012).

Selective tendering involves considering 5-8 competent road contractors to be invited to tender for a project. Criteria used in selecting up a competent road contractors can include standard of workmanship required, equipment base of the firm, previous business records, Tax compliance and financial standing amongst other factors. Selection of road contractor through this approach may overcome the deficiencies in open tendering but may lead to higher quotations. Negotiation approach is used when a firm or client has previous satisfaction association with a contractor and the client is prepared to give the contractor this contract on the basis of reasonable price. Such an arrangement is also used if the project is of specialist nature. This approach is known to save time but may lead to higher prices for the quotation (Ramus, 1981, Ganderton, 2012).

Competitive tendering approach is used where various road contractors of all categories are welcomed to submit tender. Competitive tendering must have three stages (1) Pre-qualification, (2) Tender documentation (3) Bidding (Chinyio, 2011). Competitive tendering process is encouraged because of accountability and transparency but it involves high bidding cost, conflict of interest as it is not guaranteed that the lowest bidder wins the project. Open selective tendering approach is used as a hybrid of open and selective methods. The traditional procurement method utilizes open, selective and negotiated tendering approaches to obtain its tenders (Mathonsi and Thawala, 2012).

Design and build procurement method utilizes selective tendering method for obtaining tenders from design - build contractors. Selective tendering method can be sub-divided into single stage and two-stage tendering methods. Single stage tendering is an approach where one stage of tendering is used while a two-stage tendering method involves a two-stage process of competitive selection of contractor on the basis of price and negotiation of contract details. On the first stage contractor will be assessed on the basis of construction programmes, method statement, pricing preliminaries, overheads and profits. In the second stage negotiation between the client and the contractor on price is undertaken. If agreed it becomes the contract price. This approach is advantageous in that it facilitates early appointment of a contractor and it combines strengths of competition and negotiation while its disadvantages is that the preferred contractor may fail to negotiate for the competitive price and negotiation may drag-on and compound the complexity of the process (Chinyio, 2011). Tendering approaches that are used for selecting a contractor for a road project can affect project performance. If the tendering procedure used is such that focuses on low tender price, this may result in increased risk of cost overrun on the road project due to high cost of variation (Assaf and Al-Heiji, 2006). As stated by Iyer and Jha (2005) and as cited by Soyombo and Ogunsanmi (2011) there is a need to be careful of contractor selection on road projects so as to reduce cost rising.

## **Communication and successful completion of road Construction project**

Communication usually involves the transfer of information, a generic term that embraces meaning such as knowledge, processed data, skills and technology (Cheng and Irani, 2001). Communication is also defined as transmitting messages from one person and the receiving (and successful understanding) of those messages by another person (Torrington and Hall, 1998). It is defined by others as a process in which the participants create and share information with one another in order to reach mutual understanding (Rogers and Kincaid, 1981).

Interpersonal communication generally refers to the process of communication between two or more people. An interpersonal channel is one that involves a face-to-face exchange between a source and a receiver (Rogers and Agarwala-Rogers, 1976). It is one of the forms of communication that takes place within construction projects environment and occurs directly between individuals (Dainty and Moore, 2000)

Gorse et al. (1999) for example, investigated the dynamic of interpersonal communication methods and the behavior between designers and contractors during the construction phase of projects. Their study sought to measure the perceptions of effectiveness of communication media, the most obvious examples being person-to-person interaction or the use of electronic technology as a conduit for transfer. Gorse et al. explored a range of media from informal approaches, such as face-to-face meetings to more formal methods such as letter, fax and email, their results showing that the former was perceived to be the most effective medium of communication within the industry. Gorse et al.'s findings were supported by Carlsson et al. (2001), who conducted communication research within Swedish construction industry. Their findings also indicated a preference by construction personnel for face-to-face interactions.

In group and team communication, each person will have distinct responsibilities, that will support and complement those of their colleagues. Groups of people working together are often referred to as members of a 'team', which infer that they work together in a way that synergistically utilizes their skills and knowledge. However, if they fail to communicate effectively, then they will be unable to exploit their collective talents and could instead operate less effectively as a desperate work group. For successful completion of projects the groups and team should communicate effectively by so contributing their individual talents and skills (Dainty and Moore, 2000).

Also in a construction environment co-ordination of various stages of construction process relies a lot on parties transferring appropriate and relevant information to each other to successfully interpret and implement the project in accordance with the requirements. As the project unfolds and the design is realized, information in the form of drawing, specifications,

construction methods and instructions must be communicated from one party to another. Therefore, using an appropriate communication method and communication medium to resolve construction and design problems is essential. The exchange of information needs to be straight forward, fast and reliable and no work should be unnecessarily duplicated for the project participants (Stephen,2006).It is also important to note that Road Engineers and technical personnel spend 50% to 75% of their time communicating verbally i.e. communicating effectively to each other (Sievert,1986).

Communication barriers between project teams had left the construction team almost peripheral to the design changes. They further added that by having a multi-disciplinary project team, communication systems can be improved as they will encourage face to face relationship and interaction between team members. Developed effective communication system throughout the construction supply chain will ensure reliable flow of information; establishing mechanisms for problem resolution and for generating added-value into projects. This can be implemented by using numerous techniques and tools that could assist the project team to encourage open communication and minimize the barriers to information flow (Moore and Dainty,1997).It was suggested that using ICT systems, such as a portal based system, will promote enhanced communication, co-ordination and collaboration among various disciplines and stakeholders (El-Gohary and El-Diraby,2010).Project information should be available, open and accessible to all project team members as input for efficient decision making and in order to create effective integrated project teams. The challenge is to ensure the right information gets to the appropriate person at the right time. The lack of information or a response from road project stakeholders becomes critical for progressing with project decisions. Team members should meet regularly to share information, discuss the road project plan, any issues raised and to generate ideas in order to achieve the objectives of the project, that is for the project to be completed successfully (Dainty and Moore. 2000) Road Construction projects are complex and risky, requiring the active participation of all contributors. Co-operation and co-ordination of activities through interpersonal and group communication are essential in ensuring the project is completed successfully. Poor communication, lack of consultation and inadequate feedback are to be found as the root cause of defects in many road construction works. Poor co-ordination and communication of design information lead to design problems that cause design errors. Communication is the one aspect of the management of projects that pervades all others (Stephen and Christopher, 2003).

During a project, communication can occur in various directions depending on who is communicating. There is upwards communication to management from own organization and the customer's organization. Lateral communication takes place with customers and within

project teams. Machinery needs to be put in place for further communication to take place, either downward communication (from superior to sub-ordinate), horizontal communication (between colleagues) or upward communication (from sub-ordinates to superior) (Dainty and Moore, 2000)

The importance of communication in the construction industry is so important that problems in construction are sometimes referred to as communication problems in general, Emmerson (1962); Higgin and Jessop (1965); (Latham, 1994). Construction is a fragmented and dynamic sector with a project based nature. Many stakeholders operate in frequently changing sets of relationships which are contractually driven. Insufficient communication creates information vacuum which may end up being filled with rumors. The efficiency and effectiveness of the road construction process strongly depend on the quality of communication. In literature four reasons are mentioned why improvements in communication are needed. The first reason is that an improvement in the communication within the construction team. In project teams and between project manager and contractors, could reduce failure. Second, more open communication at all levels could lead to innovations and better technical solutions. Third, communication improvement in early phases of road projects would positively influence the quality as perceived by all stakeholders involved. Finally, improved communication during the briefing might lead to better decision-making, for example less haste in moving to solutions and better ways of looking at the requirements first (Dainty and Moore, 2000)

Given that construction is such a fragmented, dynamic and disparate sector, the challenges of communicating effectively are greater than in most other production environments. Contractually driven relationships, conflict and a lack of mutual respect and trust, all combine to hinder open communication and render the role of the project manager extremely demanding and problematic. Nevertheless, addressing communication in the construction industry can be seen as a principal enabler for improving the industry in the future, consequently leading to successful completion of projects.

### **Other factors that influence successful completion of Road construction projects**

Other factors which affect successful completion of road projects include planning, project team competence and experience. Proper planning in all phases and understanding components of road construction projects are necessary to avoid rework, which if proper planning is not done leads to untimely project completion (Mojahed, 2005). On the other hand, Many companies including road construction companies make expensive investments in long term training plans for developing their employees, which is proven to be worthwhile for company development. Well trained and experienced workforce are likely to successfully manage and complete a road

project (Ramlall,2003).Road Construction uses more manpower in its business activities compared to other fields, but human resource management is still inadequate and with insufficient attention. The problems concerning human resource management in road construction projects need to be identified and methods to improve them need to be formulated and implemented for successful completion of road construction projects (Idrus et al, 2011).

### **Research Gaps**

Literature review revealed that various studies in different parts of the world have largely touched on factors relating to project delivery in terms of quality, the most important factors determining project performance in (Sudan 2012), impact of project delivery systems, cost minimization and project control on construction project success (Ghana 2013), project cost prediction model (Nigeria 2010), managing the project environment (Canada 1995), critical factors affecting quality products in construction projects (India 2006), construction contracts duration (USA 1988). Further, determinant of successful completion of rural electrification projects in Kenya (Kenya 2013) and influences on construction delivery time (South Africa 2010). These studies have been carried out and published.

Literature review reveals that there is no literature available on the factors influencing completion of road construction projects in Kisumu county. The study therefore aimed to establish (i)whether road construction projects in Kisumu county are completed in a successful way.(ii) The actual factors influencing successful completion of road construction projects in Kisumu county.

## **RESEARCH METHODOLOGY**

### **Research Design**

A research design is termed as the structure of a research which shows how the major parts of the research jointly address the investigative questions. A research design is the blue print for collection, measurement and analysis of data. (Kothari 2003) .This study used descriptive survey research method. A descriptive study is concerned with determining the frequency with which something occurs or the relationship between variables (Cooper and Schindler, 2003). It also gives a causal relationship between dependent variable and the independent variables.

The design choice was preferred since the aim of research was to get data from a road construction project environment which is complex, interdisciplinary and involving a large number of people interacting in different aspects. Descriptive survey helped to compare the quantitative reasoning of a sample and was a representation of the whole population making a standardized measurement more precise by enforcing uniform definitions upon the respondents.



This ensured that similar data was collected from similar demographical groups then interpreted comparatively. Being a descriptive study, the researcher aimed at finding out the extent of influence of procurement processes, communication, project financing, risk occurrence, on successful completion of road construction projects in Kenya. It is also correlative as it seeks to give a causal relationship between successful construction project completion which was the dependent variable and the independent variables being, communication, procurement process, risk occurrence and project financing.

### Target Population

According to Mugenda and Mugenda (1999), population refers to a complete census of all items or people in a researcher's area of study. According to Mugenda and Mugenda (2003), the target population should have some observable characteristics, to which the study intends to generalize the results. The target population shall include technical staff and Engineers from different Road Authorities within Kisumu county. They include twelve technical staff from KENHA, Eight Technical staff from KURA, Nine Technical staff from KERRA, Eight technical staff from NCA , Five Technical staff from KAA , twenty technical staff from County Government of Kisumu and elevel technical staff from surveying department.

Table 1: Target Population

Authority	Technical staff (N) / Engineers
KENHA	12
KURA	8
KERRA	9
NCA	8
KAA	5
CGK	20
SD	11
<b>TOTAL</b>	<b>73</b>

### Sample Size

A sample is a segment of the population selected to represent the population as a whole, (Kumar, Ranjit, 2005). The sample should be representative and should allow the researcher to make accurate estimates of thoughts and behavior of the larger population. Sample size is the number of observations or replicates to include in a statistical sample. The sample size is an important feature of any research study in which the goal is to make inferences about a

population from a sample. In practice, the sample size used in a study is determined based on the expense of data collection, and the need to have sufficient statistical power.

### Sampling Technique

Stratified Random sampling shall be used to select the number of Managers, technical staff and Engineers to be selected for the Research. Stratified sampling divides the population into homogenous groups such that the elements within each group are more alike than the elements in the population as a whole (Nachmias and Nachmias, 2008). Due to financial and time constraint only a sample population shall be selected for research. Qualified professional, such as Engineers, Surveyors, Project Managers, Quantity surveyors, Technicians, clients and site Managers shall be selected to answer research questions. The selection was based on the time available for conducting the research work and the reliability of the respondents, so that the overall research work would indicate the reality of the situation. Professionals are considered in order to obtain empirical, critical, valid and justifiable information based on their enormous experience (Kothari, 2008).

Yamane (1967) provided a simplified formula for calculating sample size. The sample for this study shall be the number of technical staff and Engineers selected for research. Yamane's formula is as shown below:

$$n = \frac{N}{1+N(e)^2}$$

Where; n= the desired sample size

e= Probability of error (i.e. the desired precision, e.g. 0.05 for 95% confidence level)

N=The estimate of the population size.

Table 2: Sample Size (n)

Authority	Target Population (N)	Sample Size (n)
KENHA	12	12
KURA	8	8
KERRA	9	9
NCA	8	8
KAA	5	5
CGK	20	20
SD	11	11
<b>TOTAL</b>	<b>73</b>	<b>73</b>

### Data Collection Instrument

According to Kothari (2011), primary data are those, which are collected a fresh and for the first time and thus happen to be original. Primary data shall be collected using a combination of closed and open questionnaire. Questionnaire shall be preferred because of their simplicity in administration and low cost in implementation. Secondary data shall be obtained from annual corporate reports, KENHA data bases, contract documents, project completion reports and progress reports from various KURA ,KAA,NCA and KERRA construction projects.

### Piloting of the Instrument Used

A preliminary test shall be done on the data collection instrument and procedure to identify likely problems. The researcher shall take necessary actions in time before the actual data collection. Filled questionnaires shall be tested on a few number of respondents to determine their validity, reliability and accuracy in getting the desired results.

### Validity of the Instrument Used

Ndegwa, (2013) defines validity as the degree to which the researcher has measured what he is set out to measure. It is the ability of the instrument to measure what it is designed to measure training and experience of project team, project planning, Kumar,(2005). To check the validity of the instrument the researcher shall work closely with the supervisor as the expert and agree on whether the instrument is valid or not.

### Reliability of the Instrument Used

Reliability is a measure of the degree to which a research instrument yields consistent results or data the same way each time it is used under the same condition with the same subjects.

Cronbach's coefficient  $\alpha$  test was applied to test the reliability. This was applied for each of the five research questions. A cronbach  $\alpha$  value ranging from 0.5 to 0.7 was considered acceptable as indicating internal reliability of the instrument. A score of  $>.7$  was regarded as an adequate proof of internal consistency

$$\hat{\alpha} = \frac{k}{k-1} \left( 1 - \frac{\sum_{i=1}^k p_i(1-p_i)}{\hat{\sigma}_x^2} \right)$$

Cronbach's formula

Where,  $\alpha$  is the Cronbach's coefficient,  $k$  is the number of items,  $p_i$  is the proportion of respondents answering a research question in a certain way.

### Data collection procedure

This is a set-up plan on how to introduce the study to project participants and how to follow-up to ensure that maximum response is received from the sample which is chosen. Primary data was collected using opened and closed questionnaires. Structured questionnaires were issued to 73 respondents, who were Engineers and Technicians working at different roads authorities with in Kisumu county. Two weeks were given to the respondents to complete the questionnaires before collection. A follow up was conducted after the first week of distribution to the respondents. All the questionnaires were picked after this period of time or within any other agreed date.

### Data Processing and Analysis

Data analysis entailed examining and summarizing data with the aim of extracting useful information and develop conclusions. Data analysis involved cleaning, sorting and coding of raw data collected from the field and processing by use of Statistical Package for Social Sciences (SPSS) analysis software and Microsoft Office Excel. Both descriptive and inferential statistics was used to analyze the data.

### Operational definition of Variables

Table 3: Operational definition of Variables

Research Objectives	Variables	Indicators	Measurement scale	Data analysis techniques
To assess how Procurement process Influences success Completion of road construction projects.	<b>Independent Variable</b> Procurement process <b>Dependent Variable</b> Successful completion	<b>Independent Variable</b> -Procurement practices -Tender evaluation report -Invitation to tender notices -Letter of award <b>Dependent Variable</b> Cost, time, quality	Nominal Ordinal/ Likert scale	Descriptive statistics, Inferential statistics: Spearman's correlation factor
To determine how Communication influences successful Completion of road Construction projects	<b>Independent Variable</b> Communication	<b>Independent Variable</b> -Bills of quantities -Minutes -Site instructions -Design drawings -Correspondences	Nominal Ordinal/ Likert scale	Descriptive statistics, Inferential statistics: Spearman's correlation

	<b>Dependent Variable</b> Successful completion	<b>Dependent Variable</b> Cost, time, quality		factor
To find out how risk Occurrence influences successful Completion of road construction projects	<b>Independent Variable</b> Risk occurrence	<b>Independent Variable</b> -Errors in design -Natural calamities -Inflation -Government regulation -Other risk factors	Nominal Ordinal/ Likert scale	Descriptive statistics, Inferential statistics: Spearman's correlation factor
	<b>Dependent Variable</b> Successful completion	<b>Dependent Variable</b> Cost, time, quality		
To establish how Project financing Influences successful Completion of road Construction projects	<b>Independent Variable</b> Project financing	<b>Independent Variable</b> -Cash flow -Presence/absence of funds -approval of payment certificates	Nominal Ordinal/ Likert scale	Descriptive statistics, Inferential statistics: Spearman's correlation factor
	<b>Dependent Variable</b> Successful completion	<b>Dependent Variable</b> Cost, time, quality		

## RESEARCH FINDINGS AND DISCUSSION

### Response rate

The researcher issued 73 questionnaires to respondents. This was followed by telephone calls to the respondents to request them to fill the questionnaires. Various reminders were done in this way to ensure the questionnaires were filled and returned. Out of the 73 questionnaires issued only 50 were returned. Questionnaire return rate is therefore  $=50 \times 100 / 73 = 68.49\%$ . The Questionnaire return rate as per the calculation is 68.50%. This return rate is considered sufficient for the purposes of data analysis. Babbie as cited by Ayudhya (2011) suggested that any rate of success of over 50% can be considerably reported. While the overall value of above 60% can be mentioned as good and above 70% can be mentioned as excellent.

## Respondents Demographic Information

### *Gender of the respondents*

Table 4: Gender distribution of the respondents

<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
Male	45	90
Female	5	10
<b>Total</b>	<b>50</b>	<b>100</b>

Respondent were asked in the first question to indicate whether one is male or female. The respondent showed that majority of 90% were male and minority of 10% were female. Male's domination among the respondent revealed that more men than female are engaged in road construction in Kisumu county. Gender distribution in the construction industry participants was important to show how gender balance campaign is impacting on the industry which according to research by Ndegwa (2013) is a male dominated industry. The male dominance aspect is still persistent and this can be attributed to the perception that construction industry is only for males.

### *Distribution of respondents by level of education*

Table 5: Distribution of respondents by level of education

<b>Education Level</b>	<b>Frequency</b>	<b>Percent</b>
Certificate	4	8
Diploma	16	32
University	21	42
Post Graduate	9	18
<b>Total</b>	<b>50</b>	<b>100</b>

From the results in table 5, respondents (8%) have O level certificate level of education while 16(32%) are diploma holders, 21 (42%) are degree holders and 9(18%) have post graduate qualifications. It was important to establish education level of the respondents so as to ascertain their understanding of the questions, some of which were technical. The results indicate that majority of the respondents are of degree level of education at 42% and of a frequency of 21.

### **Respondents' distribution by Profession**

The study sought to know the distribution of the respondents by profession. This was important in order to know the level of technical profession representation in road construction industry, which is largely technical in nature.

Table 5: Respondents' distribution by profession

<b>Profession</b>	<b>Frequency</b>	<b>Percent</b>
Engineer	13	26
Surveyor	8	16
Technician	16	32
Quantity Surveyor	2	4
Client	2	4
Project Manager	8	16
Site Manager	1	2
<b>Total</b>	<b>50</b>	<b>100</b>

The results indicate that 13(26%) were Engineers,8(16%)were surveyors,16(32%)were technicians,2(4%) were Quantity Surveyors,2(4%) were Client,8(16%) were Project Managers. A cumulative of 96% were either Engineer, Surveyor, Technician, Quantity Surveyor, Project Manager or Site Manager. This means that most of the respondents were in the technical field and were conversant with project management.

### **Respondents' distribution by experience**

Experience in any industry is important since it reflects the hands on time one has in the industry. Table 6 indicates the respondents' experience in years.

Table 6: Respondents' distribution by experience in Years

<b>Class (Years)</b>	<b>Frequency</b>	<b>Percent</b>
Less than 2	5	10
Between 2-5	9	18
Between 5-10	19	38
Over 10	17	34
<b>Total</b>	<b>50</b>	<b>100</b>

The respondents experience in road construction industry aimed to reflect on whether they have dealt with enough number of projects long enough to be able to report an observable pattern

that can be deduced to form a research opinion.90% of the respondent have over 2 years' experience in road construction and are able to report an observable meaningful pattern, based on their years of experience.

### Procurement process and successful completion of road construction project

Table 7: Respondents answer on whether procurement process affects successful Completion of Road Construction projects

Response	Frequency	Percent
No	4	8
Yes	46	92
<b>Total</b>	<b>50</b>	<b>100</b>

From the table a majority of the respondent 46(92%) agree that procurement process affects successful completion of road construction and a minority of 4(8%) does not agree. The analysis of the table shows respondents' strong opinion that procurement process influences successful completion of road construction project. This means that procurement process should be free of corrupt practices and favoritism. Road construction contracts should be awarded to contractors with capacity to successful execute contracts. Assaf and Al-Heiji (2006) stated that if the tendering procedure used is such that it focuses on low tender price, this may results in increased risk of cost overrun on the project due to high cost of variation. Tendering or procurement process therefore affects successful completion of road construction project.

### Procurement process and successful completion of road construction Projects

Respondent were asked to indicate the extent to which procurement process affect successful completion of road construction project.

Table 8: Procurement process and the extent to which it affects successful completion of road construction projects

Likert Scale	Extent of Agreement	Percent
1	To no extent	0
2	To a little extent	2
3	To a moderate extent	20
4	To a great extent	32
5	To a very great extent	46
<b>Total</b>		<b>100</b>



From table 8, 23(46%) agreed to a very great extent that procurement process affects successful completion of road construction project. 16 (32%) of the respondent agreed to a great extent, 10(20%) of the respondent agreed to a moderate extent, 1(2%) agreed to a little extent while no respondent agreed to no extent. From the table, the interpretation is that procurement process affects successful completion of road construction project. As stated by Iyer and Jha (2005) and as cited by Soyombo and Ogunsanmi (2011) there is a need to be careful of contractor selection on road projects so as to reduce cost rising.

### Procurement Practices that affect successful completion of road construction projects

Table 9: Procurement Practices and successful completion of road construction projects

Factors	1	2	3	4	5	N	Mean	Std
Corrupt procurement process	1	1	4	12	32	50	4.46	0.72
Awarding the Lowest bidder	0	5	9	11	25	50	4.12	1.10
Single sourcing	4	7	12	7	20	50	3.64	1.79
Nepotism	1	5	5	9	30	50	4.24	1.24
<b>Mean of 4 (1-5)</b>							<b>4.13</b>	<b>1.21</b>

From the table 9, on procurement practices that influence successful completion of road construction projects, the mean value was calculated using the formula  $\frac{\sum fx}{\sum f}$  where  $\sum fx$  is the sum of the product of  $f$ =frequency of responses and  $x$ = the likert scale range of values from (1,2,3,4 and 5) and  $\sum f$  is the sum of frequency of respondents who had attested to a particular rating among the range of (1-5) in their responses. The mean value was calculated as  $\frac{\sum fx}{\sum f} = \frac{(1 \times 1 + 1 \times 2 + 4 \times 3 + 12 \times 4 + 32 \times 5)}{50} = 4.46$ . The rests of the mean values in the study were calculated in a similar way.

Standard deviations were also calculated to show variability or consistency among responses for each of the procurement practices. Standard deviation =  $\frac{\sum f(X-x)^2}{\sum f}$  where  $X$  is a variable representing extent of agreement on likert scale and can assume any value 1,2,3,4,5 and  $x$  bar represent the mean,  $\sum f$  represent sum of the frequency. For factor on corrupt procurement process, in the table, standard deviation was calculated as  $\frac{1(1-4.46)^2 + 1(2-4.46)^2 + 4(3-4.46)^2 + 12(4-4.46)^2 + 32(5-4.46)^2}{50} = \frac{38.42}{50} = 0.72$ . The rest of standard deviations in this research were calculated in a similar way.

The mean values of 4.46, 4.12, 3.64 and 4.24 on likert scale, for corrupt procurement process, awarding lowest bidder, single sourcing and nepotism respectively, indicate that these factors

affects successful completion of road construction projects. Therefore in Kisumu county corrupt procurement process, single sourcing, awarding lowest bidder and nepotism affect successful completion of road construction projects. A mean of 4.13 from table 9, indicate that procurement process indeed affects successful completion of road construction project. This is in agreement with Rosli et al (2006), who stated that it is very important at the very outset of the project to carefully consider all factors when selecting the most appropriate procurement approach for construction projects since procurement process affects success of a project. Also as stated by Assaf and Al-Heiji (2006), that if the tendering procedure used is such that it focuses on low tender price, this may results in increased risk of cost overrun on the road project due to high cost of variation. Tendering or procurement process therefore affects successful completion of road construction project.

### Correlation between Procurement process and successful completion

Table 10: Correlation between Procurement process and successful completion

		Successful Completion	Process Procurement
<b>Successful Completion</b>	Pearson Correlation	1	
	Sig.(2-tailed)		
	N	50	
<b>Procurement Process</b>	Pearson Correlation	0.982**	1
	Sig.(2-tailed)	0.003	
	N	50	50

\*\* .Correlation is significant at the 0.01 level (2-tailed).

From SPSS, Pearson correlation value of 0.982, indicate that there exists a strong positive correlation between procurement processes and successful completion, implying that when procurement processes improves successful completion of road construction projects is also enhanced. Employing 0.01 significance levels, the results are deduced to be statistically significant with a significance value of  $0.003 < 0.01$ .

## Communication and successful completion of road construction projects

Table 11: Respondents answer on whether communication affects successful Completion of road Construction projects

Response	Frequency	Percent
No	3	6
Yes	47	94
<b>Total</b>	<b>50</b>	<b>100</b>

From table 11, a majority of the respondent 47(94%) agree that communication affects successful completion of road construction and a minority of 3(6%) does not agree. The analysis of the table shows respondents' strong opinion that communication influences successful completion of road construction project. This means that correct information about road construction projects, during execution, should be relayed on time and to the right parties involved in project supervision. This is in agreement with drucker (1985) who emphasizes the importance of communication for managers and points out that communication is essential for timely completion of projects. When issues afflicting road construction projects are addressed at the right forum and time, then delays in execution of activities is avoided. Accurate design drawings when adhered to during execution of road construction projects, ensure timely completion and quality work. Moreover adherence to contract specifications, bills of quantities and programme of works ensure timely completion and quality work.

## Communication tools in road construction projects

Table 12: Extent of agreement on whether the following are communication tools in road Construction projects (Likert Scale, 1 strongly disagree and 5 strongly agree)

Communication Tools	N	Mean	Standard Deviation
Design drawings	50	4.44	0.79
Bills of Quantity	50	4.52	0.49
Contract specifications	50	4.46	0.57
Works programme	50	4.46	0.77
Site instructions	50	4.48	0.57
Correspondences	50	4.48	0.53
Minutes	50	4.42	0.80
<b>Mean</b>		<b>4.43</b>	<b>0.65</b>

From table 12 above, means of 4.44, 4.52, 4.46, 4.46, 4.48, 4.48 and 4.42 indicate that respondents agree that design drawings, bills of quantities, contract specifications, works programme, site instructions, correspondences and minutes respectively are communication tools used to convey information to contract parties during execution of road construction projects. When executing road construction projects correct approved design drawings should be used since changes in design will result into cost variations and changes in scope of work. Bills of quantities should also be adhered to as they communicate what is entailed in the contract item by item. Works which are done out of specifications are not always approved by supervision team, since they don't meet client's expectation. Works programme should also be adhered to as it indicates period of completion a project. Correspondences and site instructions should be issued on time to avoid delay of executing activities. Minutes recorded during brainstorming, and during site meetings should ensure that issues are addressed on time. Stephen and Christopher (2003), agree that Poor communication, lack of consultation and in adequate feedback are to be found as the root cause of defects in many road constructed works. Standard deviations of less than one from the table indicate that respondents were objectively consistent while responding to this question.

### Timely communication and successful completion of road construction projects

Table13: Extent to which lack of timely communication affects successful Completion of road construction projects

Likert Scale	Extent	Percent
1	To no extent	2
2	To a little extent	4
3	To a moderate extent	18
4	To a great extent	30
5	To a very great extent	46
<b>Total</b>		<b>100</b>

From table 13, (46%) agreed to a very great extent that timely communication affects successful completion of road construction project. (30%) of the respondent agreed to a great extent, (18%) of the respondent agreed to a moderate extent, (4%) agreed to a little extent while (2%) of the respondent agreed to no extent. A majority of the respondent agree that timely communication affects successful completion of road construction project. This is in agreement with Drucker (1985) who emphasizes the importance of communication for managers and points

out that communication is essential for timely completion of projects. When issues afflicting a project are addressed on time, then such a project will progress uninterruptedly until its successful completion. However a minority of the respondent disagree with the hypothesis that timely communication affects successful completion of road construction projects. From the table, the interpretation is that procurement process affects successful completion of road construction project.

### Communication issues during contract execution

Table 14: Communication issues during contract execution

Issues	Mean	Standard Deviation
Relevant information is usually communicated on time	2.26	1.68
Channel of communication used is always agreed and accepted by all parties	4.00	1.40
Decision makers of contract project parties attend to site meetings in person.	2.30	1.85
<b>Mean</b>	<b>2.85</b>	<b>1.64</b>

From the table 14, a mean of 2.26 indicate that respondent disagree with the statement that relevant information is usually communicated on time. Relevant information is usually communicated late. This is in agreement with Moore and Dainty (1997) who stated that communication barriers between project teams had left the construction team almost peripheral to the design changes. Delay in issuance of relevant information like contract drawings will delay the project and consequently result into untimely completion of road construction projects. However a mean of 4.00, indicate that respondent agree that the channel of communication used is always agreed upon and accepted by all parties. In road construction projects Contractor, client and supervision team always agree that communication to client or from contractor should be through the project manager.

A mean of 2.30 indicate that respondents disagree that decision makers of contract project parties attend to site meetings in person. Respondents are not of the opinion that decision makers of contract project parties attend to site meetings. Resident engineers who chairs this meetings, normally represent the project manager, contractor on the other hand is

sometimes represented by his site agent. This is a cause of delay in completion of road construction projects, since the process of decision making takes long.

### Correlation between Communication and successful completion

Table 15: Correlation between Communication and successful completion

		Successful Completion	Communication
<b>Successful Completion</b>	Pearson		
	Correlation	1	
	Sig.(2-tailed)		
	N	50	
<b>Communication</b>	Pearson		
	Correlation	0.978**	1
	Sig.(2-tailed)	0.004	
	N	50	50

\*\* .Correlation is significant at the 0.01 level (2-tailed).

Pearson correlation value of 0.978, indicate that there exist a strong positive correlation between communication and successful completion, implying that when communication improves success is also enhanced. Employing 0.01 significance levels, the results are deduced to be statistically significant with a significance value of  $0.004 < 0.01$ .

### Risk occurrence and successful completion of road construction projects

Table 16: Respondents answer on whether risks occurrence affect successful Completion of road Construction projects

Response	Frequency	Percent
No	2	4
Yes	48	96
<b>Total</b>	<b>50</b>	<b>100</b>

From table 16, a majority of the respondent 48(96%) agree that risks affects successful completion of road construction projects and a minority of 2(4%) does not agree. This means

that occurrence of risks during project implementation prevent stakeholder from achieving their objective of successfully completing a road construction project. This is in agreement with Raz et al (2002) who stated that too many project risks are undesirable events which may cause construction delays, excessive spending, unsatisfactory project results or even total failure. Occurrence of risks result into delay, cost escalation and sometimes of project being done out of specifications. In some cases design drawings changes due to initial poor planning. This consequently results into escalation of cost and extension of contract completion date.

### Risks occurrence and successful completion of road construction projects

Table17:Extent to which occurrence of risk affects successful completion of road construction projects

Likert Scale	Extent	Percent
1	To no extent	0
2	To a little extent	4
3	To a moderate extent	16
4	To a great extent	30
5	To a very great extent	50
<b>Total</b>		<b>100</b>

From table 17, 50% agree to a very great extent with the opinion that risks affect successful completion of road construction project. 30 of the respondent agree to a great extent, 16% of the respondent agree to a moderate extent, 2(4%) agree to a little extent while 0% of the respondent agree to no extent. A majority of the respondent agree that risks occurrence impede attainment of successful completion of road construction projects. Baloi, et al (2012), stated that risk and uncertainties, involved in construction projects, cause cost overrun, schedule delay and lack of quality during progression of the project and at their end. To successfully complete a road project risk occurrence should be budgeted for to mitigate its effect or risk should be avoided as much a possible through careful planning. Tolerating risks will result into cost escalation and delay in completion of projects. Transferring cost of risks to client too result into cost increment and delay in completing projects.

## Extent to which risk factors influence successful completion of road construction projects

Table18: Extent to which occurrence of risk factors influence successful completion of road construction projects

Factors	N	Mean	Standard Deviation
<b>Quality risks</b>			
Not following specifications	50	4.46	0.88
Too few controls	50	4.26	0.87
<b>Cost risks</b>			
Errors in design drawings	50	4.52	0.85
Complicated project conditions	50	4.54	0.83
Variations	50	4.34	0.93
<b>Personnel risk</b>			
Lack of skills	50	4.50	0.73
Disagreement in the teams	50	4.48	0.90
<b>Set dates and deadline risk</b>			
Not handing over in time	50	4.50	0.85
Project end is delayed	50	4.62	0.66
<b>Risks of strategic decision</b>			
Failure to recognize chances	50	4.44	0.90
Lack of ability to consistently use chances	50	4.26	0.98
<b>External risks</b>			
Natural Disasters, floods/earthquakes	50	4.48	0.72
Technological changes	50	4.48	0.90
Government Regulations	50	4.36	0.71
Inflation	50	4.30	0.92
Politics	50	4.26	0.86
<b>Mean</b>		<b>4.29</b>	<b>0.84</b>

From table 18 an average mean of 4.29 indicate that respondent agree to a great extent that risk factors influence successful completion of road construction projects. When specifications are not followed then work shall be substandard and does not meet client's expectations. Changes in design drawings is also a risk as it leads to increased scope of works and



consequent cost escalations. Complicated project conditions with a mean of 4.54 indicate that respondent agree to a very great extent that encountering unforeseen physical impediments like hard rock, high water table will slow down progress of work and result into cost increment. Disagreement between project team with a mean of 4.48, slow down process of decision making, this result into delay in execution of activities. This is in agreement with Dainty and Moore,(2000), who stated that if project team members fail to communicate effectively due to disagreement, then they will be unable to exploit their collective talents and could instead operate less effectively as a desperate work group.

When project end is delayed then, contractor will continue incurring cost due to idle plants and equipment, idle labour and office overheads. This consequently results into cost escalations. Failure to recognize chances by top managers, for example when a project is delayed due to unsteady flow of funds, and a company has some unused funds in the bank, and managers are undecided on whether to use the funds or not. Natural disasters like earthquakes and floods normally adversely affect road construction by destroying already constructed bridges and washing away constructed roads. Changes in government regulation like changes in taxation affect a road construction by increasing cost of construction. This is in agreement with Martin Schieg (2006), who categorized risk that affects construction project completion as quality risks, personnel risks, cost risks, set dates and deadline risk, risk of strategic decisions and external risk.

### Correlation between Risk occurrence and successful completion

Table: 19: Correlation between Risk occurrence and successful completion

		Successful Completion	Risk Occurrence
<b>Successful Completion</b>	Pearson Correlation	1	
	Sig.(2-tailed)		
	N	50	
<b>Risk Occurrence</b>	Pearson Correlation	0.978**	1
	Sig.(2-tailed)	0.004	
	N	50	50

\*\* .Correlation is significant at the 0.01 level (2-tailed).

Pearson correlation value of 0.978, indicate that there exist a strong positive correlation between risk occurrence and successful completion, implying that when risk occurrences increases successful completion is greatly affected. Employing 0.01 significance levels, the results are deduced to be statistically significant with a significance value of  $0.004 < 0.01$ .

### Project financing and successful completion of road construction project

Table 20: Respondents answer on whether project financing affects successful completion of road construction projects

Response	Frequency	Percent
No	2	4
Yes	48	96
<b>Total</b>	<b>50</b>	<b>100</b>

From the table a majority of the respondent 48(96%) agree that project financing affects successful completion of road construction and a minority of 2(4%) does not agree. Respondents support the view that project financing affects successful completion of road construction projects. Hussin and Omran (2012) stated that, overall lack of finance to complete a project, or delays in the payment of the services by the project owners or clients can lead to significant problems.

Respondent also suggested that:

- When flow of funds to a project stops, then contractor will slow down works or may even opt to terminate his contract. That means project may be delayed or be unsuccessfully completed
- When flow of funds to a project is not steady then there will be on and off activities on site, resulting into contract delay.
- Delayed payments attract interest and this result into cost escalation.
- Idle plant and labour during stoppage attract claims from contractors and this leads to escalated contract cost.
- A project that is little funded may be done partly and later on becomes a white elephant.

## Extent to which Project financing affects successful completion of road construction projects

Table 21: Extent to which Project financing affects successful completion of road construction projects

Likert Scale	Extent	Percent
1	To no extent	0
2	To a little extent	6
3	To a moderate extent	10
4	To a great extent	28
5	To a very great extent	56
<b>Total</b>		<b>100</b>

From table 21, 56% of the respondents agree to a very great extent with the opinion that project financing affect successful completion of road construction project. 28% of the respondents agree to a great extent, 10% of the respondent agree to a moderate extent, 36% agree to a little extent while 0% of the respondent agree to no extent. A cumulative percentage of 100% of the respondent agree with the view. Olatunji (2010) stated that many observers agree that if payment by project owner is slow, the contractor may begin to commit fewer resources to a project, and may even ease out if cash flows become a problem.

## Consistency in project financing and successful completion of road construction

Table 22: Project financing consistency and successful completion of road construction projects

Cash flow	N	Mean	Standard deviation
Lack of finances	50	4.46	0.61
Lack of steady flow of finances	50	4.28	0.91
<b>Mean</b>		<b>4.37</b>	<b>0.76</b>

From the table above, a mean of 22 indicate that respondents agree to a great extent that when there is lack of finances there will be no project, and for an ongoing projects if finances ceases at one point, then the project will be stopped. While a mean of 4.28 indicate that lack of steady

flow of finances will slow down progress of a road construction project, subsequently leading to delay in completion of a project. Olatunji (2010) also stated that many observers agree that if payment by project owner is slow, the contractor may begin to commit fewer resources to a project, and may even ease out if cash flows become a problem. Flow of finances should therefore be steady and consistent. This will ensure timely completion, and that work is done to satisfaction of all parties involved in a contract.

### Correlation between Project financing and successful completion

Table 23: Correlation between Project financing and successful completion

		Successful Completion	Project Financing
<b>Successful Completion</b>	Pearson Correlation	1	
	Sig.(2-tailed)		
	N	50	
<b>Project Financing</b>	Pearson Correlation	0.935*	1
	Sig.(2-tailed)	0.020	
	N	50	50

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

Pearson correlation value of 0.935, indicate that there exist a strong positive correlation between project financing and successful completion, implying that when project financing improves successful completion is greatly enhanced. Employing 0.05 significance levels, the results are deduced to be statistically significant with a significance value of  $0.02 < 0.05$ .

### Correlation between factors

On correlation between each of the factors, the result of the table 24 indicates that there exist a strong correlation between communication and procurement process, employing a 0.01 significance level. The association between them is statistically significant with a significant value  $0.001 < 0.01$ . Also there exist a strong correlation between risk occurrence and procurement process, employing a 0.01 significance level. The association is statistically significant with a significance value  $0.002 < 0.01$ .

Table 24: Correlation between factors

		Successful Completion of projects	Procurement Process	communication	Risk Occurrence	Project Financing
<b>Successful Completion of projects</b>	Pearson					
	Correlation	1				
	Sig.(2-tailed)					
	N	50				
<b>Procurement Process</b>	Pearson					
	Correlation	0.982**	1			
	Sig.(2-tailed)	0.003				
	N	50	50			
<b>Communication</b>	Pearson					
	Correlation	0.978**	0.994**	1		
	Sig.(2-tailed)	0.004	0.001			
	N	50	50	50		
<b>Risk Occurrence</b>	Pearson					
	Correlation	0.978**	0.988 **	0.997**	1	
	Sig.(2-tailed)	0.004	0.002	0.000		
	N	50	50	50	50	
<b>Project Financing</b>	Pearson					
	Correlation	0.935*	0.945*	0.974**	0.984**	1
	Sig.(2-tailed)	0.020	0.015	0.005	0.002	
	N	50	50	50	50	50

\*\* .Correlation is significant at the 0.01 level (2-tailed).

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

There exist also, a strong positive correlation between risk occurrence and communication. The association is statistically significance with a significance value of  $0.000 < 0.01$ . There is also a strong positive correlation between project financing and other factors. There exists a strong positive correlation between project financing and procurement process, at a 0.05 significance level. The association is between them is statistically significant with a significance value  $0.015 < 0.05$ . The correlation between project financing and communication is also strongly positive at a significant level 0.01. The association being statistically significant with a significant value of  $0.005 < 0.01$ . Finally there exist a strong positive correlation between project financing and risk occurrence, employing a 0.01 significance level. The association between project financing and risk occurrence being statistically significant with a significant value  $0.002 < 0.01$ .

**Initial Contract time against Final contract time and Initial cost against Final contract cost**Table 25: Initial Contract time against Final contract time and  
Initial cost against Final contract cost

<b>Frequency</b>	<b>Initial contract time Weeks</b>	<b>Final Contract time Weeks</b>	<b>Percentage Time Deviation</b>	<b>Initial Budgeted Sum in Millions (Kshs)</b>	<b>Final Contract Sum in Millions (Kshs)</b>	<b>Percentage Cost Deviation</b>
32	0	0	0	0	0	0
1	40	45	12.5	96	120	25
1	52	57	9.61	36	42	16.67
1	24	32	33	36	43	19.44
1	20	24	16.67	27	30	11.11
1	6	9	50	106	158	49.05
1	18	40	122.2	8	12	50
1	52	76	46.20	48	60	25
1	96	120	25	60	72	20
1	36	38	5.6	45	50	11
1	36	42	16.67	62	73	17.74
1	37	48	29.73	100	142	42
1	106	158	49.10	1.38	1.58	14.49
1	8	12	50	255	298	16.86
1	48	60	25	1.5	1.6	6.67
1	60	72	20	1.2	1.8	50
1	48	52	8.33	0.9	1.2	33.33
1	49	62	26.5	1.1	1.3	18.18
1	100	142	42	1.0	1.2	20
1	15	19	26.67	1.9	2.5	31.58
1	21	24	14.30	5	8	60
1	24	30	25	7	11	57
1	13	19	4.61	8	12	50
1	9	14	55.56	1.3	1.5	15.38
1	25	21	16	1.5	1.8	20
1	27	31	14.81	1.7	2.1	23.50
1	45	49	8.88	2.0	2.4	20
1	19	23	21.05	2.4	2.7	30

Table 25, indicate that most of the road projects in Kisumu county, are not completed as scheduled, they are completed with time deviation. They are also completed with a lot of cost overruns. The projects are therefore never completed successfully. Aibinu and Jagboro (2012) found out that delay had significant impact on cost and time of execution of projects studied. Nwachukwu et al (2010), termed a road project to be successfully completed if it passed four success test criteria i.e. the time criterion – completed on time; the cost or money 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.

## **SUMMARY OF THE FINDINGS**

### **Procurement process and successful completion of road construction projects**

The research was successfully carried out in Kisumu county. Based on specific objectives of the study one of which is to assess how procurement process influences successful completion of road construction projects. 92% of the respondent agree that procurement process affects successful completion of road construction projects. A mean of 4.13 on the likert scale indicate that respondent agree that corrupt practices, awarding the lowest bidder, single sourcing and nepotism are procurement practices that influence successful completion of road construction projects in Kisumu county.

On the relationship between procurement process and successful completion of road construction projects, it can be inferred from the research findings that an  $r$  value of 0.982, indicate that there exist a strong positive linear relationship between procurement process and successful completion of road construction projects.

### **Communication and successful completion of road construction projects**

To determine how communication influences successful completion of road construction projects, 94% of the respondent agrees with the opinion. To avoid delays, correct information about road construction issues, should be relayed on time and to the right parties. A mean of 4.43 on likert scale indicate that respondents agree that design drawings, bills of quantities, contract specifications, works programme, site instructions, correspondences and minutes are communication tools used during implementation of a road construction projects. The tools should be correct and error free. A commutative percentage of 95% agree that timely communication affects successful completion of road construction projects. A mean of 2.26 indicate that relevant information is usually communicated late thereby resulting into completion delays. A mean of 1.85 on likert scale indicate that respondent disagree that decision makers of

contract parties attend to site meetings in person. However, respondents agree that channel of communication used is always agreed and accepted by all parties.

Pearson correlation result, indicate that there exist a positive linear relationship between communication and successful completion of road construction projects. An  $r$  value of 0.978 indicates that the relationship is positive and this further proves that communication influences successful completion of road construction projects.

## **CONCLUSION AND RECOMMENDATIONS**

Procurement process, communication, risk occurrence and project financing affect successful completion of road construction projects. From analysis there exists a strong positive linear relationship between Procurement process, communication, risk occurrence, project financing and successful completion of road construction projects. The strong positive linear relationship is more with Procurement process and communication followed by risk occurrence and project financing respectively. There exists also a positive linear correlation between the factors. Based on above, following recommendations are made:

- Procurement process should be fair, transparent and free of malpractices such corruption, nepotism and favourism. Competitive tendering process should be adopted so that competent contractor is awarded a contract. That is contractors with equipment, plants, financial capability, experience, competent and skilled labour force. These practices shall contribute towards successful completion of road construction projects.
- Communication tools such as design drawings, bill of quantities, contract specifications, works programme, site instructions, correspondences and minutes should be error free, information they communicate should be relevant, accurate, timely, simple to understand and interpret. When submitted with errors, time taken to correct them will result into delay, as contractor has to wait for some time. If information in them is complicated then wrong interpretation can be made resulting into rework which causes delay. Competent supervision team should also be employed so that during brainstorming and meetings issues are addressed on time, thereby avoiding delays.
- Risk occurrence can be avoided by following standards, using a lot of controls, employing skilled and competent labourers, to avoid errors in design and variations employ experienced engineers to prepare designs and prepare bills of quantities, for complicated project conditions and natural disaster a contingency fund of 7.5% should be included in the bills of quantities, for risks such as inflation a fluctuation amount of 7.5% should be included to take care of changes in prices of materials. So that projects are handed over on time, projects end date is not delayed and chances are utilized competent project



manager should be employed to manage a road construction project. Changes in technology can be addressed by reserving a contingency fund in bills of quantity for training employs on how to use the new technology. Stakeholders and client should also ensure that they support the ruling party or government, or that they in good terms with the financier so that politic does not affect successful completion of a road construction projects.

- To ensure that project financing does not affect successful completion of road construction project enough finances should be set aside for the project before it commences. This will ensure that lack of finances or lack of steady flow of finances is avoided. At the estimation stage experienced Engineers should be employed to prepare estimates, so that estimates and the project cost do not vary. Stakeholders, financier should also support the project construction, so that financing is not stopped as the project proceeds.

### SCOPE FOR FURTHER RESEARCH

This research focused on factors that influence successful completion of road construction projects. Further research is recommended in the following areas. Computer aided software and successful completion, Project planning and successful completion and Human capital and successful completion of road construction projects.

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