DETERMINANTS OF MAINTENANCE OF ROAD INFRASTRUCTURAL PROJECTS IN KISII COUNTY

BY

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DECLARATION

I confirm that this research project reports my original work and has not been presented anywhere for any academic award.

Signed…….Date……

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L50/83555/2015

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

Signed…….Date……

Dr. Moses Otieno
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DEDICATION

This research project report is dedicated to my sons Edwin, Hillary and Edgar as an encouragement/inspiration as they pursue their education in line with realizing their dreams.

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ABBREVIATIONS AND ACRONYMS

BOOT	-	Build Own Operate Transfer
CREMA	-	Contrato de Recoperation yMantenemients
FHWA	-	Federal Highways Administration
KeNHA	-	Kenya National Highways Authority
KeRRA	-	Kenya Rural Roads Authority
KeRRA	-	Kenya Rural Roads Authority
KURA	-	Kenya Urban Roads Authority
KURA	-	Kenya Urban Roads Authority
MRP	-	Minor Roads Programme
MTRD	-	Material Testing Research Department
MUTCD	-	Manual on Uniform Traffic Control Devices
NHWZSPD	-	National Highway Work Zone Safety Programme Development
RAR	-	Rural Access Roads
RB	-	Roads Board
RF	-	Road Fund
RMI	-	Road Maintenance Initiative
RTTP	-	Rural Travel and Transport Programme
SIDA	-	Swedish International Development Cooperation Agency
SSATP	-	Sub-Saharan Africa Transport Policy Programme
VOC	-	Vehicle Operating Costs

ABSTRACT

Quality of main and rural road network continues to deteriorate as a result of the challenges facing the maintenance of this infrastructure. This study focused on the determinants of implementation of maintenance of road infrastructure projects in Kisii County. Chapter One of the study was the introduction and the problem statement touching on the purpose of the study. The objectives of the study were to determine how funding influence maintenance of roads infrastructure projects, determine the extent to which manpower influence maintenance of roads infrastructure projects, assess the extent to which community participation influence maintenance of roads infrastructure projects and establish how political factors influence maintenance of roads infrastructure projects. Chapter Two highlights the literature reviewed in relation to road construction and maintenance both in Kenya and internationally. The study focused on the factors influencing maintenance of tarmac, gravel and earth roads in Kisii County. The target population of the study was4 respondents per constituency and 5 respondents from the County Government, 7 from KeRRA and 2 KURA and the County Government. The study applied a mixed research method. Secondary data was collected using questionnaires which will be studied to support the research findings. Secondary data was derived from road works implementing agencies and other stakeholders. Qualitative data was analyzed qualitatively based on analysis of feedback emanating from respondents' information and documented data. The research findings were intended to assist in the improvement of services in the road sector in Kisii County.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Inadequate road construction and maintenance may be due to several reasons. Insufficient funds, including a lack of foreign exchange, shortage of qualified staff, absence of machines and spare parts, deficient institutional arrangements, and poor management capability are normally held responsible for the problems. The most common reason given for inadequate maintenance is the difficulty in securing the necessary funds. It is true that only limited funds are available for road maintenance in most countries, but it is also apparent that the funds allocated for maintenance are generally not utilized very efficiently. Often funds are diverted to non-maintenance projects, they are used on activities with political rather than economic priority, or they are used to support large labour forces which are unproductive (Robinson, 1988).

Lack of foreign exchange is also a problem in many developing countries. In particular, lack of foreign exchange impedes the purchase and operation of mechanical equipment. The adoption of labour-based technology is seen by a number of developing countries as a viable solution to this problem. Labour is often readily available and labour-based techniques are appropriate for a number of maintenance activities. Labour-based methods are likely to be cheaper than those based on equipment where the labour rate is less than about $4-6 per day. The shortage of qualified and skilled staff is a fundamental problem in Kenya, Kisii County inclusive. The recognition of this situation has led to new development projects often incorporating training of local staff as an important component. Training should be an on-going feature of employment in the road organization, so that competent staffs are available to take over when experienced personnel leave.

Absence of equipment is linked to lack of foreign exchange and shortage of qualified staff to maintain the equipment. However, the allocation of foreign exchange and the presence of qualified mechanics do not necessarily secure an efficient utilization of existing equipment. In several studies it has been observed that the utilization of existing tractors and motor graders is down to 30% and 10% respectively because of bad management and bureaucratic procedures in the procurement of spare parts. In an efficient road organization, tractors and graders should be

in use more than 50% of the work time. Institutional and Studies of road operation in developing countries have consistently highlighted management deficient institutional arrangements and management practices as major reasons for issues inadequate road maintenance. Most road agencies have too many responsibilities. Too much emphasis is often put on execution, whilst planning, control and evaluation are neglected. These aspects of road maintenance are evident in our counties.

1.1.1 Maintenance Capability and Management

The maintenance capability of the responsible road agency should be a key criterion when appraising new road projects. If it is likely that the future road will not receive adequate maintenance, then it is unlikely that future benefits will be achieved, and the proposed project should not be implemented. In such cases, it would be more advisable to improve the maintenance of existing roads. An indication of capability can be obtained from a survey of the condition of existing roads. Inefficient use of limited funds for road maintenance is often closely linked to poor maintenance planning. It has, therefore, been concluded by many agencies that the improvement of management practices is a prerequisite to improving maintenance capability. Such an approach usually needs to be supported by the implementation of maintenance management systems.

1.1.2 Approach to Maintenance Management

Because of the intense pressure to make optimum use of limited resources, maintenance management presents a greater challenge to the road engineer than maintenance techniques. Most maintenance techniques are relatively straightforward and easily acquired through well-organized training. Maintenance engineers must have a detailed knowledge of all maintenance techniques, but supervision of the majority of maintenance activities should be delegated to technicians or foremen. The maintenance engineer should utilize his time better by planning, programming, budgeting and monitoring these activities (Brooks, *et al.*, 1989).

Maintenance management objectives include:

To encourage the use of a systematic approach to decision-making within a consistent and defined framework; To provide a common basis for assessing maintenance needs and resource requirements; To encourage the adoption of consistent maintenance standards; To assist in the

effective allocation of resources and To encourage regular review of policies, standards and the effectiveness of programs.

In simple terms, maintenance management aims to get the right people, materials and equipment, to the right place on the road network, to carry out the right remedial or preventative work, at the right time. Maintenance management is normally undertaken as a cycle of activities, carried out on an annual basis that involves setting of maintenance policy, objectives and standards; Classification and preparation of road register; Assessment of maintenance needs; Calculation of resource requirements; Assessment of priorities when resources are constrained; Scheduling and executing of works and Monitoring of performance.

1.1.3 Maintenance Policy, Objectives and Standards

Policies are the key issue in the management of road infrastructure maintenance. They define the broad level of service which the highway authority intends to provide in terms of level of comfort, safety, economic benefit and the cost of provision. As an example the following road maintenance policy has been adopted by the Ministry of Surface Transport in India:

‘To maintain and operate the highway system in a manner such that: Comfort, convenience and safety are afforded to the public; the investment in roads, bridges and appurtenances is preserved; the aesthetics and compatibility of the highway system within the environment is preserved; and the necessary expenditure of resources is accomplished with continuing emphasis on economy. Whereas policy statements are fairly broad in their scope, objectives quantify these to be more explicit. For example, an objective reflecting the 'comfort, convenience and safety' aspect of the above policy might be that 'pot-holes will be repaired within one week of being reported'. Standards then provide the thresholds that trigger action. For example: the standard would define what is a pothole, i.e. 'localized very severe ravelling extending to greater than the full depth of the wearing course'. Policies, objectives and standards should be agreed initially, and then should be monitored on a regular basis to ensure their continued applicability, making changes when this proves necessary.

1.1.4 Assessment of Maintenance Needs

In order to assess the maintenance needs of a road network it is necessary to register the present defects. A condition survey is usually based on a visual inspection. For major roads it is good practice to supplement the visual inspection with mechanized measurements. Mechanized data are more repeatable, reproducible and, generally, can be collected more efficiently. Mechanized data collection provides scientifically based techniques to assist in the determination of causal factors of defects, to monitor changes in condition, to assess strength and to help determine appropriate treatments. Visual inspections are normally used for registration of all conspicuous defects of pavement, shoulders, ditches, culverts, slopes, and road furniture. A visual condition survey of the road network should be carried out at least once a year to assist in determining maintenance needs for the next budget period. In inspection countries with a tropical climate, the drainage system should be inspected twice a year: once in the rainy season and once in the dry season. The evaluation of the condition in the rainy season is especially important as the drainage system can only be evaluated satisfactorily when there is water present.

It is useful if the engineer responsible for the road maintenance participates personally in visual inspections. This will ensure that he is able to plan maintenance works effectively, based on his familiarity with the road network, and is able to control the quality of work executed. Normally when inspecting a road section, the road is divided into subsections, Recording typically 100 or 200 metres in length. The road register marker posts are used as a reference. For each distress mode, the extent and the severity of the defect are recorded. Recording of defects should be supplemented by an assessment of their possible causes. Knowledge of causal relations is fundamental for the selection of appropriate repair methods. Mechanized measurements include recording of functional as well as structural parameters. The most widely used functional parameter is the roughness.

1.2 Problem Statement

Inefficiency, poor road maintenance management methods, corruption among other reasons are attributed to the poor conditions of roads in Kenya (Robinson, 2005). This is illustrated by the many corruption studies conducted in the past which have shown the Ministry of Roads as one of the corrupt government institutions (TI, 2006). Poor road maintenance management methods largely promote these vices, for example, a maintenance management system which is not

efficient is bound to allow weak areas for corruption to flourish like during the tendering process. Other areas such as prioritization of roads for maintenance are usually abused by politicians and other interest groups at the expense of the common man. The funds allocated for paved and unpaved road maintenance may not be enough for maintaining all roads but if well utilized can improve the conditions of roads every year and with time many roads will be covered. Ways of improving management of these maintenance funds need to be addressed. There have been attempts to introduce changes in the past to improve management but challenges always emerge.

Infrastructure is listed as one of the key pillars that will stimulate growth and achievement of the vision 2030 with ways of improving efficiency and effectiveness of infrastructure at all levels of planning, contracting and constructing identified as one of the targets in the vision. Roads alone contribute 80% of the total infrastructure in Kenya and therefore to achieve this vision on development, ways of improving efficiency have to be employed especially in the rural areas in order to open routes to markets. Hence the need to utilize good road maintenance practices that improve management efficiency.

1.3 Purpose of the Study

The purpose of this study was to identify the determinants influencing maintenance of road infrastructure projects in Kisii County. The study aimed at examining the challenges and shortcomings of maintaining roads in Kisii County and recommendation on how to overcome them.

1.4 Objectives of the Study

The study was guided by the following objectives:-

i) To determine how funding influence maintenance of roads infrastructure projects in Kisii County.
ii) To determine the extent to which manpower influence maintenance of roads infrastructure projects in Kisii County.
iii) To assess the extent to which community participation influence maintenance of roads infrastructure projects in Kisii County.

iv) To establish how political determinants influence maintenance of roads infrastructure projects in Kisii County.

1.5 Research Questions

It is absolutely essential to develop a research question that you are interested in or care about in order to focus your research. A focused question is easier to research and can be covered more fully and in more depth.

The following research questions were used to focus on this research study:

i) How do funding influence road maintenance of roads infrastructure projects in Kisii County?

ii) To what extent does institutional/contractors' manpower influence maintenance of roads infrastructure projects in Kisii County?

iii) How does community participation affect maintenance of roads infrastructure projects in Kisii County?

iv) To what extent political inputs influence maintenance of roads infrastructure projects in Kisii County?

1.6 Research Hypothesis

The study sought to test the following hypothesis:

i. H_0: Funding does not influence road maintenance of roads infrastructure projects in Kisii County

ii. H_0: There is no significant relationship between manpower and maintenance of roads infrastructure projects in Kisii County.

iii. H_0: There is no relationship between community participation and maintenance of roads infrastructure projects in Kisii County.

iv. H_0: Political inputs does not influence maintenance of roads infrastructure projects in Kisii County

1.7 Significance of the Study

Road users are seeing improved quality of road networks in reforming countries - leading to reduced vehicle operating costs and travel times. Quality improvements have been unevenly realized however - as with funding allocation, rural roads lag well behind main, trunk and urban

roads. Evidence suggests trends in improvement in operational efficiency, aided by adoption of commercial practices and transparency in the use of funds. However these gains have been constrained by capacity limitations in both the road agencies and the industry itself.

The Kenya's development strategy is guided by the all-Important Vision 2030, which visualizes "a globally competitive and prosperous Nation Offering a High Quality of Life to all Kenyans by 2030" with three pillars, namely Economic, Social, and Political. The Vision 2030 Implementation strategy utilizes Medium Term Plans (MTPs) The MTPs are Implemented through Medium Term Expenditure Framework (MTEF) which targets and applies sector approach, the key sectors being Physical Infrastructure, Agriculture, and Rural Development, Environment, Water and Sanitation. The national MTP was derived from District Development plans for each district in the Country. The MTPs include due consideration to linkages between sectors, in an approach to ensure the planned sector economic growth.

The Road Sector. The transportation sector and the road sector in particular, is a key enabler of economic growth by providing access for goods and services for inputs and also to markets. The transportation sector in general and the road sector in particular, have been identified under the Kenya's Vision 2030 as one of the key sectors to drive the economy towards poverty reduction.

1.8 Delimitation of the Study

The study focused on the factors influencing maintenance of road infrastructure in Kisii County. It was conducted in the nine Sub-counties. Data was collected from stakeholders including the road maintenance implementing agencies (KURA, KeRRA, the County transport and infrastructure office, contractors and road users. The findings from the study represented the status and varying condition of road construction and maintenance standards in the County.

1.9 Definition of Significant Terms

Implementation: Is the realization of an application or execution of a plan, idea, model design, specification, standard, algorithm or policy.

Rehabilitation: Restoring the road to previous condition, by strengthening or replenishing the existing vulnerable formation which suffer damage.

Resource: Financial, raw material, plants, equipment and human resource.

Road Maintenance: Suitable regular and occasional activities required or undertaken to conserve as nearly, and as long, as possible the original condition of an asset or resource while compensating for normal wear and tear. It includes minor repairs and improvement to eliminate the cause of defects and avoid excessive repetition of maintenance efforts.

1.10 Organization of the Study

Chapter one explains about the background of study and the problem of statement. The aim and objectives are defined in this chapter including the scope of study. Chapter Two discussed about the literature review of this study. This chapter explained the theoretical background of the study and discussed the work done by previous researchers. Chapter Three highlighted about the research methodology. This chapter described the detail methodology to be used for this study. The research methodology included literature review, data collection, data analysis and conclusion. Chapter Four contains the analysis of the collected data and the results obtained and Chapter Five gives the summary of the discussions and findings and recommendation for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The topic of construction broadly encompasses the issues relevant to the process of road construction and maintenance, including the design, contracting, implementation, supervision, and maintenance of roads and related structures, such as bridges and interchanges. For purposes of the knowledge base presented here, the topic covered will include public works, private contracting of civil works, and labor-based construction techniques. With respect to the process of maintenance, this will include road maintenance in general, as well as the private contracting of maintenance activities.

2.2 Construction

The design and construction of infrastructure project can be undertaken in different ways. Normally, either in-house project execution or contracting. Construction can also be done using either labour-based methods, machine based or a combination of the two.

2.2.1 Public Works

While adoption of competitive bidding for road and other civil works has been the norm in most countries of the world, some countries do not have a sufficient industry of independent contractors and road works are mostly done by force account or awarded to state construction agencies on a negotiated basis. In many of these countries, not only are cost high and quality low, it is common for suppliers of construction materials and services to have monopoly power, further increasing inefficiency and lowering quality. In these situations, it is a combination of transferring work from the public to private sector and the introduction of competition into operations that is often the best way to decrease inefficiency and improve quality. Introducing competitive bidding into public works contracts is also often an important first step to this goal. Secondly, the contracting out of the works function requires the introduction of competition into the operation of road agencies themselves, either by the greater use of existing private contractors, or by allowing public sector agencies to compete with the private sector.

2.2.2 Contracting of Civil Works

Where the private sector is relied on for the construction of roads, it is the bidding and contracting documents which are the foundation of the construction process. In recent years, as the process of contracting has quickly evolved, and contractors have experimented with new ways of acquiring new business and enhancing profit, there is an awareness of the need to refine these basic documents, particularly in the areas of risks and incentives. The construction industry has historically not dealt well with risk, leading to many failed contractors through poor planning, poor budgeting, and poor resource management On the owner's side, the push to minimize costs is often an absolute goal, regardless of market realities, resulting in impossibly low prices being accepted as part of bids and contracts which give owners all the rights and contractors all of the obligations. To overcome these problems during road construction, risks must be properly defined and the remedies associated with these risks spelled out in a way that eliminates the incentive of the contractor to bid other than at his best price. The owner must also be protected against irresponsibly low bids that later result in excess claims and controversy Apart from insisting on clarity of contract terms, the owner should also carry out close scrutiny of the bidder's credentials and the responsiveness of his bid, and they should also be linked to awarding to the lowest responsive, responsible bidder. New approaches, ranging from management contracts to Build Own Operate Transport (BOOT), should be considered as valid options, together with the more traditional methods of bidding on the basis of existing designs and specifications

There are options for creating an enabling environment for the construction industry, thus leading to more involvement of private contractors and consultants in improved management of road assets. The process, which is of particular importance for economies in transition, begins with separating the functions of planning and management from implementation of road works. Different forms of contract have several implications on the risk allocation between client and contractor; the risks to the highway agency tend to decrease as the agency shifts from force account (or direct labor) to short-and long-term forms of contract with the private sector, including concessions.

2.2.3 Labor-Based Construction and Maintenance Methods for Road Works

Using labor-based methods for road works has been an important part of the strategy to improve rural transport infrastructure in Africa over the past twenty-five years. These methods not only produce gravel roads of equal quality to those produced using equipment-based methods, but they also generate rural employment in a cost-effective manner. Although labor-based methods have proved to be a cost-effective alternative to equipment-based methods in many low-wage Sub-Saharan African countries, these methods have not been applied on a large scale.

The Rural Travel and Transport Program (RTTP) - a component of the Sub-Saharan Africa Transport Policy Program (SSATP) - launched a study to find sustainable solutions to this problem. The RTTP, with the support of a number of bilateral donors, has over the last two years examined experiences in Africa to identify why labor-based programs have not been adopted on a large scale and to develop appropriate reforms.

Experience gained under the RTTP identifies two key reforms that are necessary to mainstream labor-based programs, but which have not received the attention they require These are improved financial management, to ensure that funds flow adequately and laborers are paid on time, and decentralization, to streamline payment procedures and strengthen stakeholders' support of these programs These two reforms, together with government commitment, effective labor laws, appropriate design standards, and training, should facilitate the mainstreaming of labor-based programs in counties where such methods are feasible. While addressing these reforms, program designers can begin to establish a suitable delivery mechanism.

2.3 Maintenance

Maintenance may be defined as the act of preventing and keeping infrastructure and other facilities as nearly as possible in their as constructed or subsequently improved conditions and the operation of facilities and services to provide safe and satisfactorily transportation for motoring public. Failure to maintain infrastructure properly leads to rapid deterioration with consequent increases in operating costs, accidents and also expensive reconstruction.

2.3.1 Road Maintenance

Proper road maintenance contributes to reliable transport at reduced cost, as there is a direct link between road condition and Vehicle Operating Costs (VOC). An improperly maintained road can also represent an increased safety hazard to the user, leading to more accidents, with their associated human and property costs. Examples of ways in which different countries contract road maintenance services. In general, road maintenance activities can be broken into four categories:

Routine works. These are works that are undertaken each year that are funded from the recurrent budget. Activities can be grouped into cyclic and reactive works types. Cyclic works are those undertaken where the maintenance standard indicates the frequency at which activities should be undertaken. Examples are verge cutting and culvert cleaning, both of which are dependent on environmental effects rather than on traffic levels, Reactive works are those where intervention levels, defined in the maintenance standard, are used to determine when maintenance is needed. An example is patching, which is carried out in response to the appearance of cracks or pot-holes.

Periodic works. These include activities undertaken at intervals of several years to preserve the structural integrity of the road, or to enable the road to carry increased axle loadings. The category normally excludes those works that change the geometry of a road by widening or realignment. Works can be grouped into the works types of preventive, resurfacing, overlay and pavement reconstruction. Examples are resealing and overlay works, which are carried out in response to measured deterioration in road conditions. Periodic works are expected at regular, but relatively long, intervals. As such, they can be budgeted for on a regular basis and can be included in the recurrent budget. However, many countries consider these activities as discrete projects and fund them from the capital budget.

Special works. These are activities whose need cannot be estimated with any certainty in advance. The activities include emergency works to repair landslides and washouts that result in the road being cut or made impassable. Winter maintenance works of snow removal or salting are also included under this heading. A contingency allowance is normally included within the recurrent budget to fund these works, although separate special contingency funds may also be provided.

2.3.2 Maintenance by Contract

Contracting for specific items of maintenance work, such as the resealing, overlay or reconstruction of a specific length of pavement are widely used and there is considerable experience of this. However, particularly for road maintenance works, there is often a need for contracts to cover a wider scope of work. For example: Algeria, Belgium, Brazil's DNER, British Columbia, Chile, Kenya, Malaysia and Pakistan use standard contract documents which may be different for major and minor maintenance works. Routine and periodic maintenance operations are sometimes contracted separately. This practice is used mostly in Chile, Kenya and Pakistan, and is applied frequently in other countries to more complex periodic activities, such as pavement or bridge repair work. In Algeria and Brazil, maintenance contracts for specific road sections combine execution of routine and minor periodic maintenance.

Some countries, including Canada (British Columbia), the United Kingdom and Malaysia have experience of including all maintenance activities on specific routes, or within entire geographic areas, in comprehensive maintenance contracts combining both periodic and routine works. Contractors additionally are responsible for managing the maintenance and operations programs, including performing routine patrols and detailed inspections to identify needs, setting priorities, scheduling the work, and public relations. The contracts used by British Columbia now have a five-year duration, whilst the United Kingdom is using three-year contracts. Malaysia uses contracts of two-year duration. Contractors in these countries indicated that they consider five years is appropriate to provide them with sufficient incentive to invest in costly, specialized equipment.

To address internal inefficiency and accountability issues, a number of Latin American countries have, over the last decade, moved decisively and successfully from force-account (direct labor) to contract maintenance. There has also been considerable progress in the region to transfer to the private sector, through concessions, the responsibility of improving, maintaining, and operating high-traffic volume roads, the cost of which is recovered from tolls. Among the most advanced countries in this respect are Argentina, Brazil and Chile. More recently, some countries, particularly Argentina, have switched from the traditional quantities and unit price-based short-term maintenance contracts to long-term performance-type or results-based contracts. The new approach encompasses either routine maintenance activities alone, or

integrated contracts involving both the rehabilitation and routine maintenance of road networks (such as the Contrato de Recuperacion Mantenimiento (CREMA) system in Argentina). A paper, "Areawide Performance-Based Rehabilitation and Maintenance Contracts fro Low-Volume Roads", presents a framework for extending the CREMA concept to cover both the paving and future maintenance of low-volume roads.

Cutting the cost of road maintenance and improving road conditions are the main reasons why several Latin American countries have started to look for new ways of contracting out road maintenance. With technical assistance from the International Road Federation and German Aid, Colombia, Brazil, Guatemala, Peru and Uruguay have initiated so called Performance Specified Road Maintenance Contracts on a pilot basis. In addition, Argentina and Chile have let several such contracts recently. In this scheme the Road Authority serves as the owner, but out-sources both the management and production of the maintenance work to a single contractor. Most of these contracts have been operating for more than a year and cover routine maintenance and, in some cases, periodic maintenance and road rehabilitation as well. Extension of the road network, road surfaces and conditions, and the time period vary in each project and provides a Wide basis for evaluation and improvements.

2.3.3 Monitoring, Implementation and Evaluation of Roads

Road maintenance, especially with respect to the contracting and bidding for civil works, requires the effective evaluation and supervision of contractors and their bids. Without this ability at tender, marginal or unacceptable bidders can distort the bidding process by excessive underbidding for contracts or future inability to complete. At the point of construction, poor contractors can raise owner's supervision and staffing costs substantially. Management of the road network requires different information, at different levels of the decision-making process, for example, for planning, for programming, for design, and for implementation. The data to be collected by an inspection system, and where, and how it should be collected, depend largely on the use of the data. Senior managers in road administrations may also be required to make decisions about the choice of computerized road management systems that are to be implemented within their organizations. The consequences of such decisions can be very costly, not only in terms of the cost of initial system procurement, but also because of the on-going costs

of system management and data collection. The implementation of systems can have far-reaching effects on all aspects of the operation of the road administration. Hence, it is important that managers are aware of the need for an effective approach to system implementation, and of the pitfalls of making inappropriate decisions in this area.

2.4 Factors Influencing Road Maintenance

The study relates to factors influencing maintenance of road infrastructure projects in Kisii County. Roads provide the principle mode of access, and are key factor to trade, industry and social development.

Roads in Kisii County are inefficiently governed due to split of responsibility between the tiers of governance that control the sector. This study analyses how human, technological, and organizational as well as other factors influence the maintenance of roads infrastructure projects in Kisii County.

2.4.1 Influence of Funding on the Managing Roads Maintenance

A report by the World Bank (2010), looking at infrastructure in Sub-Saharan Africa also casts doubt on the viability of exclusion through toll financing, even for major trunk roads. It notes that toll roads currently make up only 0.1 % of the region's formal road network, and that these are found almost entirely in South Africa. Going further, it estimates that a minimum traffic volume of 15,000 vehicles a day is necessary for toll concessions to be economically viable, and that these conditions exist on less than 10% of the existing Sub-Saharan road network, with these areas concentrated in South Africa and some areas of Nigeria. These forecasts demonstrate the difficulties of viable exclusion in the roads sector, but also illustrate that there is unexploited potential for doing so, at least within South Africa and Nigeria, and that this may become more viable in the future, if and when traffic volumes increase.

Rafiqui (2003) provides a different perspective from rural Laos, where questions of economic viability combined with a lack of local legal ownership over community constructed and maintained roads have been found to undermine the ability of communities to exclude and charge tolls to non-local users. The author also notes initiatives organized by the Swedish International Development Cooperation Agency (Sida) and others that provide models for

community roads and use taxation of non-community members to provide at least partial finance for them" Exclusion may therefore be possible but requires a legal framework and an acceptance that this cannot be the main source of road financing under most circumstances.

2.4.2 Influence of Manpower in Road Maintenance

The impact of the skilled labor shortage in construction has continued to plague the construction industry since the recession (2007-2011) where approximately 2 million construction workers were let go (more than any other industry). Ever since then, the construction industry has not been able to make up for this loss of skilled labor and has struggled to fulfill the many construction jobs that are becoming more readily available. The National Association of Homebuilders estimates that there are approximately 200,000 construction jobs that have been left unsatisfied due to the labor shortage. This inverse relationship between the availability of construction jobs and the availability of a skilled workforce is only going to continue to be a problem in 2017 as the promise of new infrastructure is coming from the new administration. The promising growth of new construction projects should be exciting news for the construction industry; however, it poses a challenge to construction firms as they struggle to be able to staff such large projects with enough qualified workers.

Here are some ways the skilled labor shortage has impacted the construction industry:-

2.4.2.1 Many People are Scared to join the Construction Industry

The recession and layoffs of 2007-2011 lead to the loss of many of the skilled construction workers and professionals who had been in the industry for a long time. After these people had been let go, the construction industry was forced to start from square one, since many of the skilled workers were already let go and nearing retirement age. Also, many of the younger people entering the workforce have avoided construction as a career path due to its volatility of job security in the past.

2.4.2.2 Less of a Focus on Trades and Vocational Schools

Another reason why fewer people are entering the construction workforce is the lack of emphasis on the trades in high school and college. Most young adults are being guided toward the traditional 4-year university routes and never consider learning a trade.

2.4.2.3 Fewer Apprenticeship Programs

The recession also led to fewer apprenticeships and internships. Apprenticeship programs typically allow the employer to "test out" new employees before hiring them full-time and allows the apprentice to gain valuable hands-on work experience. Without these apprenticeship programs, employers are hiring workers before their skills have been evaluated, and less young entrants to the workforce are gaining hands-on experience before being thrown into the field. This lack of apprenticeships has also led to a less skilled young workforce overall. If more construction firms were offering apprenticeships, it might not only attract young workers, but it would also act to head-start these new workers on their skill sets so that they might become highly skilled construction workers later in their construction career.

2.4.2.4Less Qualified Workers Pose Safety Concerns

Safety concerns go hand in hand with the hiring of less than qualified workers to staff the increasing number of projects. This is a concern especially with a high-stakes job like construction, where a lack of skills can mean very devastating results.

2.4.2.5 Rising Costs to both Project Owners as well as to Contractors

Costs of construction projects have risen for both project owners, as they are forced to pay more to get a project completed on time, as well as for contractors who have had to increase compensation and benefits to attract new talent. According to a survey conducted by Associated General Contractors of America, 52% of participants said that they had increased their base compensation for all workers, while 28% have improved benefits to stay competitive in the market for talent acquisition. How does the construction industry combat this issue of a skilled labor shortage? The construction industry must be able to demonstrate its value as a career to the upcoming workforce. There are many ways that the construction industry can do so.

2.4.2.6 Reaching out to the Younger Generations

Construction firms need to partner with local schools to be considered by young adults as a career path worth pursuing. This partnership will lead to opportunities to appear at career events, speak in front of classrooms, appear on the school's career connection websites, and many other benefits. By visiting local high schools and colleges, construction firms will be able to get young adults thinking about a career in construction before they finalize their career path.

2.4.2.7 Investing in Training Programs

To create a more highly skilled workforce overall, construction firms need to invest in training for all employees. To do so, construction firms should have extensive training for all new employees, refresher training courses for all-level employees, and mentorship programs that will allow the senior workers to pass along their knowledge to the younger working generation before they retire. In addition to skills training, construction firms should also utilize training from the Occupational Safety and Health Administration in order to train new employees to improve safety on-site.

2.4.3 Community Participation

In simple terms participation is the active involvement of a community to take part or share in an activity. Types of participation are shown in Table 2.1.

Table 2.1: Community Participation

Participation Type	Characteristic
Passive participation	People participate by living in the area of the project. They may be told what is going to happen or has already happened but will have no other input.
Participation for material incentive	People participate by being paid for labour in food or cash, for a pre-determined project. This may be as a 'community' or as groups.
Participation by resource contribution	People participate by contributing a resource such as labour or money, to a pre-determined project.
Participation by consultation	People participate by being consulted (perhaps with options) on projects where the majority of the decisions have been made. Their view may/may not be considered.
Interactive participation	People participate by joining with external professionals in analysis of their situation, developing action plans and determining common projects.
Spontaneous mobilization	People participate by taking their own initiate independent of external professionals to change their situation. This may lead to self-help projects or request to other institutions for assistance.

It is argued that if communities participate in the maintenance of transport infrastructure, not only would this be more cost effective but it would have important developmental spin-offs. These would include improved cash income opportunities, skill development and a greater sense of ownership. For central government and important local roads, the benefits of community participation particularly apply to routine maintenance, which suits the skill profile of farming communities and can be adapted to fit in with the agricultural calendar.

However, the lack of local government funds means the community participation is increasingly applied to the periodic and emergency maintenance of community and feeder roads. In this situation, the lack of road construction skills and materials can limit the effectiveness of unskilled community labour.

2.4.4 Political Inputs Influence in Roads Maintenance

According to van de Walle and Mu (2007), in Vietnam the preference for rural road construction over and above maintenance, and the willingness to transfer aid money for that purpose, indicates that local politicians view road construction as more politically salient and face political incentives that reward them for prioritizing construction over maintenance.

According to Wilson (2004), in the context of Peru, looking at both the modern era and the immediate post-Independence period: the ability of road construction to allow greater government influence in the provinces and easier mobilization of the coercive force of the state meant that, even where roads were not demanded, or even were resisted, they were still eventually provided. In the current era, there is a clear alignment between salience emerging from this desire to expand state authority and demand from rural people for connectivity. This ensures that road construction is a highly politically salient task and that, to a large extent, maintenance loses out as a result.

Kenya provides a good example of how ethnic polarization can lead to political market imperfections that then provide incentives for road construction targeted for patronage purposes. Burgess et al., (2009) examine this case in detail, noting that Kenya has great ethnic and regional fragmentation, with five groups comprising 70% of the population, which have a high degree of geographic concentration and social segregation. They argue that this provides the ideal conditions for ethnic favoritism and patronage politics, as resources can be targeted to

politicians' ethnic power bases with considerable ease and strong identities provide a common point of political identification for poorly informed voters.

For the roads sector, this contributes to the diversion of resources (chiefly paved road construction projects) towards areas that have provided support for ruling parties and politicians. Burgess, *et al.*, (2009) demonstrate this by analyzing a comprehensive dataset of post-Independence era information on road construction patterns in Kenya, the (relatively unchanged) geographic distribution of ethnic groupings and the identities and home regions of central government ministers. They find strong evidence that road expansion in any given year is closely related to the home regions of the prime minister and the minister of public works, and to ethnic groups represented in the Cabinet, with the second largest group receiving a particular boost. This suggests that politicians have used road construction as a mechanism for distributing patronage, either to secure their own power bases, or to ensure political stability. This may contribute to under-provision of roads in some areas and a deterioration of the road network in areas that lack a high-ranking minister or political connections. With the new devolved roads, the same problem is likely to take a different dimension from ethnicity being replaced by clanism where the County is composed of one ethnic group.

2.5 Funding Road Works

In response to the deteriorating condition of the road network and the high associated economic costs in Africa, various consultations were held during the 1980s and early 1990s under the umbrella of the Bank-managed and donor-financed Road Management Initiative (RMI), to set the broad outline of a new policy framework for the road sector. The new policy framework puts emphasis on the commercialization of road management and advocates institutional reforms, such as the establishment of dedicated road funds managed by autonomous road boards comprised of road user representatives.

Early experiences with the classic road funds was not entirely satisfactory as they were set up as a line item in the national budget, administered and largely delivered by government departments and allocated according to more or less pre-defined priorities. The distinguishing feature of the "second generation road funds" supported by the RMI is that they are conceived of as commercial entities, managed by user representatives who both gain the benefits from the

road facilities they provide but also hear the cost of any increase in charges which they approve.

The issue has been controversial as the road funds are seen in some quarters to represent a form of earmarking - distorting the allocation of resources, hampering budgetary control, impairing revenue structure flexibility and infringing on requirements of efficient cash and financial management. In contrast, transport professionals view road funds as offering the advantages of decentralization and autonomy - leading eventually to greater efficiency in use of resources - as well as assuring an improved allocation of these resources ill favor of maintenance which may have particularly high rates of return.

In their paper 'Improving Road Management and Financing', Stephen Bround and Kumar A. examined road funds recent performance in a few selected countries in Africa where these have been in existence for some time, based on three guiding principles: (i) have they improved resource allocation? (ii) have they improved operational efficiency; and (iii) have they improved the quantity and quality of road maintenance? While it may be true that the experiences remain quite recent and the track record is not long, there is never a perfect time for such evaluation and monitoring. Too soon and the true effects may not have become apparent. Too late and observations of the effects may have been obscured by many other long run economic adjustments.

The evaluation discussed in the paper showed that autonomous road boards have been set up in most of the countries studied. They are generally being professionally managed and are representative of user interests performing the role of service procurers. The road funds are financed by incremental user charges (mostly fuel levy) and funding for maintenance shows an improvement over the past. The road funds have been successful in stabilizing road financing, improving works programming efficiency and encouraging a move towards contracting and resurgence of the domestic contracting industry. One of the key elements of the road funds has been the consultative process followed in their preparation and wide dissemination of their performance as a result of which the reform process enjoys public support.

However, the evaluation suggests that setting up a dedicated financing arrangement is a necessary but not a sufficient condition to ensure that a sustainable and stable basis of road maintenance is established - translating into improved service delivery across all levels of the

road hierarchy. While maintenance of the primary network has improved, quality of the rural roads has continued to deteriorate. The money available in the road funds, though a considerable improvement over the past, is still not sufficient ill any case to address all road maintenance needs. Salient reform issues which deserve further attention are: mechanisms to broaden road fund resource base; strengthening of the capacity of road management agencies to accelerate implementation of maintenance; and arrangements to address non-primary roads needs and to build capacity of local contractors and consultants. The paper finally argued that effective technology transfer and efficient use of new technologies in the road sector in Africa must go hand in hand with robust and commercially oriented road management.

2.6 Country Examples

Zambia was amongst the first countries to reform its road sector management in the 1990s and set up a National Roads Board in 1994 to manage a "second generation" road fund that had been created in 1993. This has been followed by the setting up of roads boards in Ethiopia, Ghana and Malawi in 1997. The Kenya Roads Board Act was enacted by the Parliament in January 2000 and a Board established in July 2000. The arrangements vary from setting up road funds under the existing Finance Act (in Zambia) with the Board members acting in advisory rather than an executive capacity, to creating the road fund under new legislation (in Malawi) as a public enterprise with the power to set road tariff, an independent chairperson, dominated by the private sector and financially autonomous. Some of the RBs serve only as procurer of services and are responsible primarily for managing the use of RFs (Zambia, Ghana, Ethiopia) while others are responsible both for managing the use of RFs and serving as service providers (Malawi). In Ghana, legislation mandates the RF revenues to be collected under government's tax making powers. In Ethiopia, the RF has elements of the "first generation" road fund it was set up under a new legislation but the board is public sector dominated and a major proportion of the user charges are from government contributions rather than an "incremental" user charge.

2.6.1 Key Points in Summary

In all cases examined, the RBs are having some impact on improvement in resource use efficiency and resource allocation.

A firm legislative basis seems to help, as do clear, executive powers spelled out for the RB to follow.

While road users are now formally involved in road management and financing decisions, the impact on efficiency of resource use has been less than expected to date.

Similarly, the new structures have only had a marginal impact to date on commercialization of road management.

Despite the existence of road construction and maintenance institutions, and resource allocations by the road funds, the road sector has not met the road user expectations of providing all weather access of low operating costs. This is mainly due to the challenges facing this sector more on resource distribution, institutional capacity, political inputs and human activities. This research intends to address these challenges so as to improve on gap that has not been addressed by previous literature especially within the County Government under the new devolution structure.

2.7 Conceptual Framework

The conceptual framework gives a depiction on how the variables relates to each other. The variable district here is the independent, dependent and moderating variable. The independent variables affect and determined the effect of another variable. The independent variables of this study are funding, manpower, community participation and political interference. The dependent variable is maintenance of road infrastructure projects. The moderating variable is measured and manipulated to discover whether or not it modifies the relationship between the independent and dependent variables. Government policies, procurement practices, materials and environmental issues are identified as moderating variables. Maintenance of road infrastructure was researched and examined by means of many indicators of performance articulated by factors such as quality of roads and cost effectiveness. The conceptual framework is shown in Figure 2.1 below.

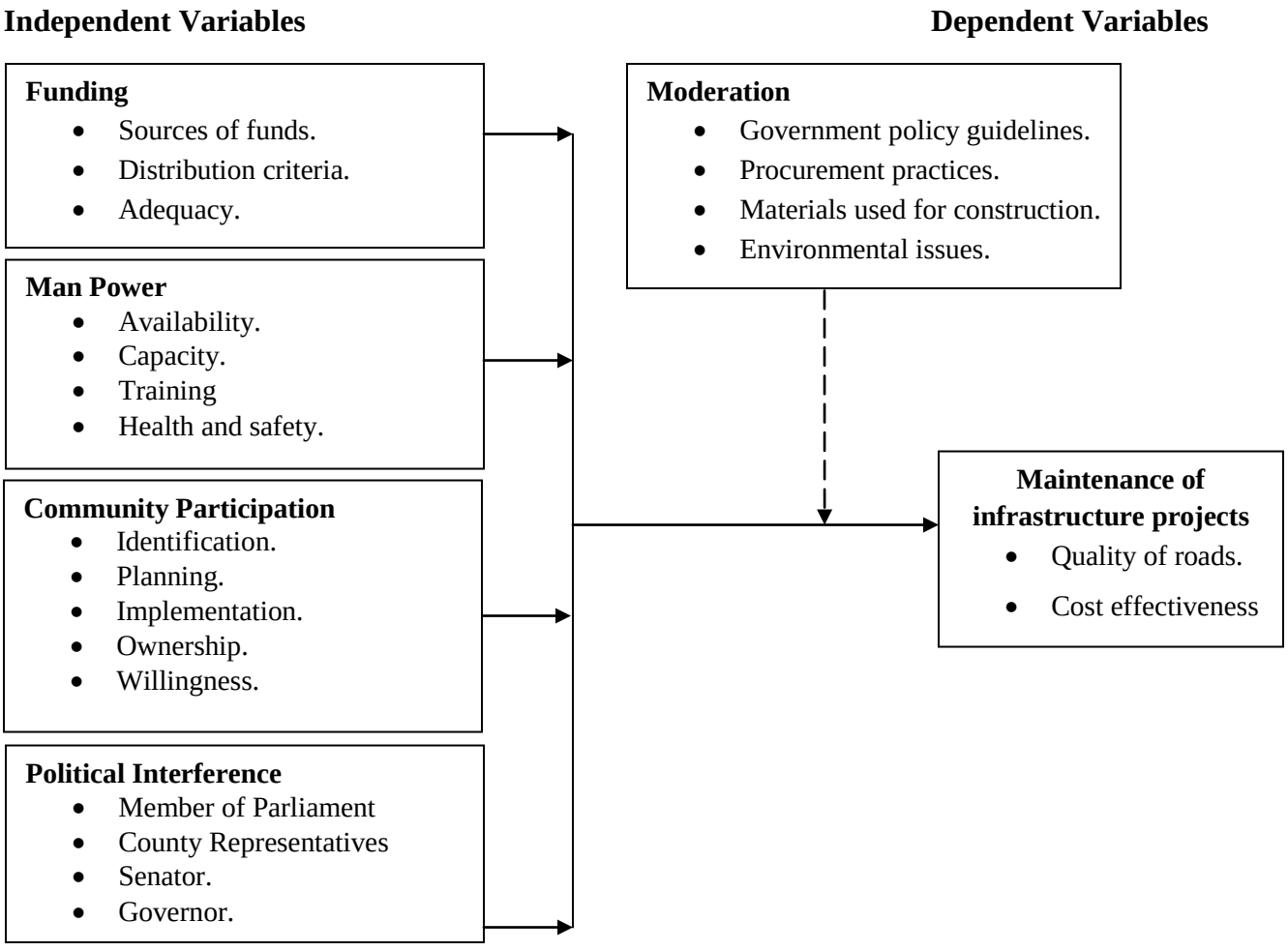

Figure 2.1: Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this research methodology was to provide a sound platform for the researcher to achieve the aim and objectives of the study. This chapter will highlighted the chronological order of research methodology, discussed on how the research methodology was conducted in order to achieve the objectives of this research. It was also be important in obtaining relevant primary data from the selected group. From there, an analysis was conducted to study the data obtained from respondents and finally, based on the results obtained, a conclusion was derived.

3.2 Research Design

The research design used in this study was a mixed design. This included conducting a survey and use of questionnaires. Research participants were selected purposefully, especially those who have been involved in road works in various positions for interview and in focus discussion groups.

3.3 Target Population

The target population for this study covered the nine constituencies in Kisii County. The population was drawn from stakeholders in the road, sector that included contractors, County Government staff, Heads of Departments from road construction and maintenance agencies under the Ministry of Transport and Infrastructure, Local Administrators and citizens.

3.4 Sample Size and Sampling Techniques

The study used a non-probability sampling technique. The nine (9) Sub-County units in the county were selected purposely so that only the important items representing the true characteristics of the population were included in the sample. Elements were chosen based on the purpose of this study.

3.5 Data Collection Instruments

This study used both primary and secondary data collection methods.

3.5.1 Primary Data

The collection of first hand information from the target population was done using questionnaires, interviews and reports.

3.5.2 Secondary Data

Secondary data was obtained through literature, references such as books, conference papers, reports and internet.

3.6 Validity and Reliability of Research Instruments

Conclusions made by researchers depend much on the information collected through research instruments. This research therefore ensured that the instruments used were evaluated further for validity and reliability before data collection.

3.6.1 Validity

Paton (2000) states that, validity is the quality attributed to proposition or measures to the degree to which they conform to established knowledge or truth. Therefore content validity of the research instruments was established in order to make sure that they reflect the content of the concepts in question. The research instruments were compared with study objectives and the set questions. Experts were consulted to scrutinize the relevance of the instruments against the study objectives.

3.6.1 Reliability

Reliability is the measure to which a research instrument yields consistency results after repeated trial. In this study, a selected pilot group from the target population was used to test the reliability of the instruments. The study used the test-re-test method to establish the degree of reliability.

3.7 Data Analysis Technique

From the mixed research design, qualitative data was analyzed by arranging responses in relation to the research questions and objective. Descriptive analysis was used to analyze primary data of quantitative nature (Structured questions).

3.8 Ethical Considerations

The researcher adhered to research ethics that included seeking consent in administering data collected from the relevant bodies, citations and also confidentiality.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter discusses on data analysis obtained from the interviews and questionnaires. The questionnaires are divided into two parts, which include the respondents' background and factors influencing rural road infrastructure projects. The researcher administered the questionnaires and used interviews to collect the data. Respondents for the questionnaires were mainly officers working with road implementing agencies KURA, KeRRA and the County Government and also representatives from constituency road committees. Interviews were also conducted with the local contractors and the general public.

4.2 Questionnaire Return Rate

A total of 50 questionnaires were distributed, based on the number of staff in the institutions responsible for road maintenance activities. 42 questionnaires were returned, giving a response rate of 84%. This rate is attributed to the clear instructions given and the reasonable deadline for the returning of the questionnaires. Also targeting the majority population that has been involved in road sector programs contributed the response rate (Table 4.1).

Table 4.1: Distribution of Respondents

Organization or Group	Distribution of Respondents	
	Frequency	**Percentage**
KeRRA	6	14
KURA	3	7
County Government	5	12
Others	28	67
Total	**42**	**100**

4.3 Demographic Characteristics of the Respondents

In social sciences research personnel characteristics of respondents have very significant role to play in expressing and giving the responses about the problem, keeping this in mind, in this study

a set of personal characteristics namely age, gender, education, experience of the 42 respondents have been examined and presented in this chapter.

4.3.1 Gender of the Respondents

Gender is an important variable in a given Kenyan social situation which is variably affected by any social or economic phenomenon and globalization is not an exception to it. Hence the variable gender was investigated for this study. Data related to gender of the respondents is presented in Table 4.2.

Table 4.2: Gender of the Respondents

Gender	Distribution of Respondents	
	Frequency	**Percentage**
Male	31	74
Female	11	26
Total	**42**	**100**

It is clear from Table 4.2 that out of the total respondents investigated for this study, overwhelming majority (74%) of them were males whereas about (26%) were found to be females. Due to various unavoidable and unique conditions and not because of any attitudinal change per se hence large numbers of respondents are males by gender in this study.

4.3.2 Age of the Respondents

Age of the respondents is one of the most important characteristics in understanding their views about the particular problems; by and large age indicates level of maturity of individuals in that sense age becomes more important to examine the response.

Table 4.3: Age of the Respondents

Age in Years	Distribution of Respondents	
	Frequency	**Percentage**
20-30	7	17
31-40	11	26
41-50	15	36
51-60	9	21
Above 61	0	0
Total	**42**	**100**

It is evident from the table above that most respondents are between years of 41-50 years of age with a percentage of 36%.

4.3.3 Educational Level of Respondents

Education is one of the most important characteristics that might affect person's attitudes and the way of looking and understanding any particular social phenomena. In a way, the response of an individual is likely to be determined by his educational status and therefore it becomes imperative to know the educational background of the respondents. Hence the variable academic qualification was investigated by the researcher and the data pertaining to academic qualifications is presented in Table 4.4.

Table 4.4: Level of Education of the Respondents

Level of Education	Distribution of Respondents	
	Frequency	**Percentage**
Certificate	12	28
Diploma	18	43
Degree	10	24
Masters	2	5
Others	0	0
Total	**42**	**100**

Table 4.4 shows that about 28 percent of the respondents were educated up to certificate level and relatively higher number of them, 43 percent were educated up to Diploma level. The number of respondents attaining degree education was 24% and mainly in KeRRA, KURA and County Government staff. Only 5% of the respondents were educated up to the post graduates level. It can be concluded from the table above that by and large the respondents were progressive in education, which is so important today to create a knowledge based society.

4.3.4 Work Experience in Road Sector

Respondents work experience was vital in this study. This is to ensure reliable data in the research findings.

Table 4.5: Work Experience in Road Sector

Years	Distribution of Respondents	
	Frequency	**Percentage**
Less than 3	2	5
3 – 4	6	14
4 – 5	22	52
Over 5	12	29
Total	**42**	**100**

These research responses show that the majority of the respondents (52%) have an experience while a small percentage (5%) has an experience of less than 3 years.

4.4 Determinants Influencing Rural Roads Maintenance

The aim of the study was to investigate the determinants influencing rural roads maintenance. The same was sought from the respondents and the findings presented in the following sub-sections.

4.4.1 Funding Road Maintenance

Regarding the first objective, the study investigated the effect of funding of roads in Kisii County. The respondents were asked to describe the adequacy of the amount allocated and their agencies. The study findings are presented in the table below.

Table 4.6: Allocation of Funds to Road Maintenance Agencies

Response	Frequency	Percentage
Inadequate	26	62
Slightly adequate	10	24
Adequate	6	14
Total	**42**	**100**

4.4.1.1 Budgetary Amounts allocated to Road Maintenance Agencies

The respondents were asked to investigate the amount of funding allocated to the agency. The research responses showed that majority of the respondents (62%) cited that the funds allocated to the agency is inadequate while the minority of the respondents (14%) cited that the funds allocated to the agency is adequate.

4.4.1.2 Number of Tranches

The respondents were further asked to indicate how many tranches were disbursed for every project. The findings were presented in Table 4.20 below.

Table 4.7: Number of Tranches

Number	Frequency	Percent
One	0	0
Two	32	76
Three	10	24
Total	**42**	**100**

The research responses showed that majority of the respondents (76%) cited funds disbursed from Head Office for any project are in two tranches while the minority of the respondents 10 (24%) cited that funds disbursed from Head Office were any project are in three (3) tranches.

4.4.1.3 When Funds are received from Head Office

The study wanted to find out when the project funds were received. The respondents were sought for this and the findings were presented in Table 4.21 below.

Table 4.8: When Funds are received from Head Office

Period	Frequency	Percent
At the beginning of financial year	34	81
Middle of the financial year	5	12
End of the year	3	7
Total	**42**	**100**

The research responses showed that majority of the respondents 34 (81%) cited that funds are received at the beginning of the financial year while the minority of the respondents (7%) cited that the funds are received at the end of the year.

4.4.2 Influence of Manpower in Construction

The second objective of the study examines the influence of manpower in road infrastructure. The study explores an availability, performance, challenges and importance of manpower in the road sector.

4.4.2.1 Status of Availability of Skilled Manpower in the Road Construction Sector

Respondents were requested to indicate the status of availability of skilled manpower in the road construction sector. The results are as shown in Table 4.9 below.

Table 4.9: Status of Availability of Skilled Manpower in the Road Construction Sector

Status	Frequency	Percentage
Adequate	15	35.3
Inadequate	27	64.7
Total	**42**	**100.0**

From the study, it was noted that majority of the respondents as indicated by 64.7% were of the opinion that skilled manpower in the road construction sector is inadequate while 35.3% were of contrary opinion. This implies that skilled manpower in the road construction sector is inadequate.

4.4.2.2 Effect of Skilled Manpower Availability on Performance of Contractors in Road Projects

The study sought to establish the extent to which availability of skilled manpower influence performance of road agencies and contractors in road construction projects as shown in the table below.

Table 4.10: Effect of Skilled Manpower Availability on Performance of Contractors

Statements	Mean	Std. Dev.
Availability of skilled and semi-skilled labour helps to expedite the achievement of project goals hence performance of road agencies and contractors.	4.71	0.46
Lack of semi and skilled labour delays or stalls altogether the performance.	4.22	0.64
Skilled labour provides quality performance of construction projects.	4.53	0.67
Skilled labour saves wastefulness of resources during construction of roads.	4.53	0.64

From the study, it was noted that majority of the respondents strongly agreed that availability of skilled and semi-skilled labour helps to expedite the achievement of projects goals hence performance of road agencies and contractors as shown by a mean of 4.71, skilled labour provides quality performance of construction projects as shown by a mean of 4.53, skilled labour saves wastefulness of resources during construction of roads as also shown by a mean of 4.53. Majority of respondents also agreed that lack of semi and skilled labour delays or stalls road construction projects altogether as shown by a mean of 4.22.

4.4.2.3 Effect of Skilled Manpower Challenges on Road Construction Projects

The study sought to determine the extent to which challenges on skilled manpower influence road construction projects. The results are shown in the table below.

Table 4.11: Effect of Skilled Manpower Challenges on Road Construction Projects

Challenges in Skilled Manpower	Mean	Std. Dev.
Shortage of manpower.	3.96	1.13
Lack of financial resources.	4.31	0.93
Cost of manpower development.	3.59	0.98
Lack of appreciation to the role of manpower development.	3.94	0.99
Lack of training program.	3.80	0.92
High labour turnover.	4.04	0.87
Low level of education.	3.92	0.93

From the study, most of the respondents indicate the following challenges as having significant influence on skilled manpower in road construction projects. Lack of financial resources as shown by a mean of 4.31, high labour turnover as shown by a mean of 4.04, shortage of manpower as indicated by a mean of 3.96, lack of appreciation to the role of manpower development as shown by a mean of 3.94, low level of education as indicated by a mean of 3.92, lack of training program as shown by a mean of 3.80 and cost of manpower development as shown by a mean of 3.59.

4.4.2.4 Importance of Skilled Manpower in the Road Sector

Respondents were requested to describe the importance of skilled manpower in road construction sector. From the study, all respondents supported the view that skilled manpower is important as it improves capacity with the agencies and contractors performance.

4.4.3 Community Participation

4.4.3.1 Development Agency's Approaches and Community Participation

The research sought to establish the influence of development approaches to community participation in rural road infrastructure projects in the study area. This was important to knowhow road agencies and the County government could have encouraged or discouraged community involvement in the road infrastructure project.

4.4.3.2 Partnership Approach

The research sought to determine the development agency's approach in road infrastructure project planning and implementation as shown by the qualitative data. This was important since the approach taken determines the level of community involvement in the project development.

From the findings, the majority of the respondents indicated that, in the partnership between road agencies and the community to plan and implementation of road infrastructure projects, the agency is the one who largely control the decision. However, some of the respondents indicated that community members controlled the decision making process. Therefore, it can be inferred that, the agencies had a greater say in the planning and implementation of road infrastructure projects as the community were largely sidelined when it comes to the same. This meant that

residents could not articulate their ideas and have their voice heard in relation to planning and implementation of road infrastructure projects. It is also important to note that this was largely in the county government and unlike in the other road agencies where constituency road committees and organized stakeholder consultations participate in decision making.

4.4.3.3 Road Infrastructure

The research sought to establish who initiates road infrastructure projects within the study area as indicated by the data in Table 4.12. The origin of road infrastructure project idea was very important to determine the involvement of the communities, their ownership and eventually sustainability.

Table 4.12: Initiators of Road Infrastructure Projects in the Community

	Frequency	**Percentage (%)**
Community	5	11.9
Road agencies	25	59.5
Others	12	28.6
Total	**42**	**100.0**

From the finding, the majority of the respondents 25 (59.5%) indicated that most of the road infrastructure projects were initiated by road agencies while 5 (11.9%) of the respondents indicated that the community initiated some road infrastructure projects. However, 12 (28.6%) of the respondents indicated that other forces also initiates road infrastructure projects in the community which includes local leadership and donors. Therefore, this indicated that a majority of the road infrastructure projects in the community are initiated by external forces.

4.4.3.4 Planning and Implementation of Road Infrastructure Projects

This section sought to determine if partnership encouraged community involvement in planning and implementation of road infrastructure project as shown Table 4.15. This was important to know the role of the community in partnership during road infrastructure project implementation.

Table 4.13: Planning and Implementation of Road Infrastructure Projects

	Frequency	Percentage (%)
Yes	7	17
No	35	83
Total	**42**	**100**

The researcher found out that there was limited partnership of the community in planning and implementing road infrastructure projects as indicated by majority 35 (83%) of the respondents as shown in Table 4.13. While 7 (17%) of the respondents indicated there was some level of partnership with donors and road agencies in planning and implementing road infrastructure projects. This was an indication that the community partnership engagement was limited to attending meetings, offering manual labour with limited project identification and financing.

4.4.3.5 Participation in Monitoring and Evaluation of Road Infrastructure Projects

The researcher sought to determine if the partnership allowed community participation monitoring and evaluation of road infrastructure projects as shown in the data in Table 4.14. This would reveal the role of the community in ensuring that, the standard of road infrastructure projects are adhered to.

Table 4.14: Participation in Monitoring and Evaluation of Road Infrastructure Projects

			How they Participated			Total
			Answering Questions	Attending Meetings	Not Applicable	
Participation in monitoring and evaluation of road infrastructure development projects in locality.	Yes	Count	5	1	0	6
		% within how they participated.	100.0%	100.0%	0.0%	29%
	No	Count	0	0	36	36
		% within how they participated.	0.0%	0.0%	100.0%	71%
Total		**Count**	**5**	**1**	**36**	**42**
		% within how they participated.	**(100%)**	**(100%)**	**(100%)**	**(100%)**

The researcher found out that majority 36 (86 %) of the respondents do not participate in monitoring and evaluation of road infrastructure project in their locality as they are not empowered to undertake in the process as shown in Table 4.14. However, 6 (14%) of the respondents stated to have participated in monitoring and evaluation of road infrastructure projects in their locality; by either inspections or attending meetings of the same.

4.4.3.6 Seminars or Road shows to synthesize the Public on Road Usage and Preservation

The respondents were asked to indicate if their agency held seminars and road shows to synthesize the public on road usage and preservation. The findings were presented in Table 4.15.

Table 4.15: Holding of Seminars and Road Shows

Response	Frequency	Percent
No	30	71
Yes	12	29
Total	**42**	**100**

The findings indicate that most 30 (71%) of the respondents disagree that their agency hold seminars or road shows to synthesize the public on road usage and preservation while 12 (29%) of the respondents agree that their agency hold seminars or road shows to synthesize the public on road usage and preservation.

4.4.3.7 Experiencing Problems as far as Human Activities from the Locals are concerned

The respondents were also asked to indicate how often they experienced problems from the locals. The findings were presented in Table 4.16.

Table 4.16: Experiencing Problems as far as Human Activities from the Locals are concerned

Response	Frequency	Percent
Never	6	14
Occasionally	18	43
Always	18	43
Total	**42**	**100**

The data in Table 4.16 reveals that 18 (43%) cited that the organization occasionally experience problems as far as human activities from the locals are concerned while 6 (14%) of the respondents cited that the organization does not experience problems as far as human activities from the locals are concerned.

4.4.4 Political Input

In line with the fourth objective the study sought to find out the effect of political interference on roads infrastructure projects in Kisii County.

4.4.4.1 Political Influence on Identification of Road Projects

The respondents were asked to indicate the amount of political influence on identification of road projects. The study findings were presented in Table 4.17.

Table 4.17: Political Influence on Identification of Road Projects

Influence	Frequency	Percent
None	2	5
Very minimal	5	12
Very much felt	35	83
Total	**42**	**100**

The research responses showed that majority of the respondents (83%) cited that the influence of politicians in regards to identification of road projects is very much felt while the minority of the respondents (5%) cited that there is no influence of politicians in regards to identification of road projects.

4.4.4.2 Political Influence in the Award of Tenders

The study further investigated the level of political influence in the award of tenders. The study findings were presented in Table 4.18.

Table 4.18: Political Influence in the Award of Tenders

Influence	Frequency	Percent
Sometimes	14	33
Always	25	60
Not at all	03	07
Total	**42**	**100**

The results in Table 4.18 showed that majority of the respondents 25 (60%) that local politicians always influence on the award of tenders while the minority of the respondents 3 (7%) cited that local politicians do not influence on the award of tenders.

4.5 Hypothesis Testing

4.5.1 Hypothesis Testing for the Influence of Funding on Maintenance of Roads Infrastructure Project

$H_{O:}$ Funding does not influence maintenance of roads infrastructure project in Kisii County.

Table 4.19: Showing chi-square testing on the influence of funding on maintenance of roads

O	E	O-E	$\frac{(O-E)^2}{E}$
6	14	-8	4.57
10	14	-4	1.14
26	14	12	10.29
			$\frac{\sum(O-E)^1}{E}$**=16**

χ^2C =16> χ2 = 5.991 at 2 degrees of freedom and 5% level of confidence.

Since the calculated chi-square value of 16 is greater than the critical chi-square value at 5% level of confidence, we reject the null hypothesis and accept alternative hypothesis. Thus, Funding does not influence maintenance of roads infrastructure project in Kisii County.

4.5.2 Hypothesis Testing for the Effect of Skilled Manpower on Maintenance of Road Projects

$H_{O:}$ There is no significant relationship between manpower and maintenance of roads infrastructure project in Kisii County.

Table 4.20: Showing Chi-Square Testing on the Influence of Skilled Manpower on Maintenance of Roads

O	**E**	**O-E**	$\frac{(O-E)^2}{E}$
3.96	3.94	0.02	0.0001
4.31	3.94	0.37	0.0347
3.59	3.94	-0.35	0.0311
3.94	3.94	0.00	0.0000
3.80	3.94	-0.14	0.0050
4.04	4.94	0.10	0.0025
3.92	3.94	0.02	0.0001
			$\frac{\sum(O-E)^1}{E}$**=0.0753**

χ^2C =0.0753> $\chi2$ = 12.592 at 6 degrees of freedom and 5% level of confidence.

Since the calculated chi-square value of 0.0753 is less than the critical chi-square value at 5% level of confidence, we accept the null hypothesis and reject alternative hypothesis. Therefore, there is no significant relationship between manpower and maintenance of roads infrastructure project in Kisii County.

4.5.3 Hypothesis Testing for the Influence of Community Participation and Maintenance of Roads

$H_{O:}$ There is no relationship between community participation and maintenance of roads infrastructure projects in Kisii County.

Table 4.21: Showing Chi-Square Testing on the Influence of Community Participation on Maintenance of Roads

O	E	O-E	$\frac{(O-E)^2}{E}$
6	14	-8	4.57
18	14	4	1.14
18	14	4	1.14
			$\frac{\sum(O-E)^1}{E}$**=6.85**

χ^2C =6.85> $\chi2$ = 5.991 at 2 degrees of freedom and 5% level of confidence.

Since the calculated chi-square value of 6.85 is greater than the critical chi-square value at 5% level of confidence, we reject the null hypothesis and accept alternative hypothesis. Thus, there is relationship between community participation and maintenance of roads infrastructure projects in Kisii County.

4.8 Hypothesis Testing for the Influence of Political Inputs on Maintenance of Roads

$H_{O:}$ Political inputs do not influence maintenance of roads infrastructure project in Kisii County.

Table 4.22: Showing Chi-Square Testing on the Influence of Political Inputs on Roads Maintenance

O	E	O-E	$\frac{(O-E)^2}{E}$
2	14	-12	10.29
5	14	-9	5.79
35	14	21	31.50
			$\frac{\sum(O-E)^1}{E}$**=47.58**

χ^2C =47.58> $\chi2$ = 5.991 at 2 degrees of freedom and 5% level of confidence.

Since the calculated chi-square value of 47.58 is greater than the critical chi-square value at 5% level of confidence, we reject the null hypothesis and accept alternative hypothesis. Thus, Political inputs influence maintenance of roads infrastructure project in Kisii County.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the research findings, conclusion and recommendations of the study. The findings and recommendations are also in response to the research questions of this study.

5.2 Summary of Findings

The first objective was to determine how funding influence, road infrastructure maintenance projects in Kisii County. The respondents in this study were asked their view on the amount, number of tranches and when disbursed to the agencies for road maintenance implementation.

The second objective was to determine the extent to which manpower and capacity of the road agencies influence maintenance projects in Kisii County. The respondents investigated the agencies human capacity in planning and reporting, procuring process, execution, monitoring and evaluation of road maintenance projects in the county.

The third objective sought to assess the extent to which communities' involvement in road maintenance projects and how their activities influence road maintenance projects in Kisii County.

The fourth objective was to establish how politics influence maintenance of road infrastructure projects in Kisii County. The respondents were asked to investigate how, politics and politicians influence in project identification and award of tenders and allocation of resources to the projects.

5.2.1 Funding of Roads

The research responses showed that majority of the respondents (62%) cited that the funds allocated to road agencies is inadequate while the minority of the respondents (14%) cited that the funds allocated to road agencies is adequate. The research responses showed that majority of the respondents (76%) cited that funds disbursed from Head Office for any project are in two tranches while the minority of the respondents (24%) cited that funds disturbed from Head

Office for any project are in three tranche. The research responses showed that majority of the respondents (81%) cited that funds are received at the beginning of the financial year while the minority of the respondents (19%) cited that the funds are received at the beginning of the year and the end of the year.

5.2.2Manpower

The study established that availability of skilled manpower enabled road agencies to achieve overall goals of the agency as skilled employees delivered quality work. Skilled employees perform quality work and can increase the number of clients quickly than any other organization and availability of skilled manpower enhanced the performance of road agency staff and contractors in the road construction sector and vice versa. Lack of semi-skilled and skilled labour causes significant project delays and sometimes leads many road construction projects to stall or be abandoned altogether thereby adversely affecting road agencies and contractor performance.

5.2.3 Community Participation

As community participation is new to many planners and engineers the monitoring and evaluation of its use will enable learning from experience, as well allowing the project to keep a track of progress and activities.

5.2.4 Political Interference

The research responses showed that majority of the respondents (83%) cited that the influence of politicians in regards to identification of road projects is very much felt while the minority of the respondents (5%) cited that there is no influence of politicians in regards to identification of road projects. The research responses showed that majority of the respondents (81%) cited that local politicians always influence on the award of tenders while the minority of the respondents (7%) cited that local politicians do not influence on the award of tenders.

5.3 Conclusion

The study aimed at finding out how funding, manpower, community participation and political interference influence maintenance of road infrastructural projects in Kisii County.

The research findings reflect some of the results of performance of RMLF in Kenya and to see how well the RMLF have measured up to what was expected of them as one means of addressing

the need for adequate and secure financing for road maintenance. The road sector reforms can be seen as the start of a process for increasing private sector participation in the planning, programming and management of the road works. The reforms have created a framework under which the private sector, as a key player on KRB has a pivotal role to play in planning and resource allocation mechanisms. For all its shortcomings, the introduction of the fuel levy and other user charges as the major source of maintenance funding is a major step forward from the earlier days when resources for road works were based on uncertain allocations from central budgets which might or might not have any relation to the actual maintenance needs.

While these are encouraging trends and represent a significant departure from the past, RMLF administrations and road agencies are not free from all the past constraints suffered by public sector works departments – technical assistance and knowledge sharing is required over some time before fully effective arrangements can be put in place for efficient maintenance of the road network.

The study noted that skilled manpower in the road construction sector is inadequate. The availability of skilled & semi- skilled labour helps to expedite the achievement of project goals and hence performance of road agencies and contractors. Skilled labour provides quality performance of construction projects and saves wastefulness of resources during construction of roads. Lack of semi & skilled labour delays or stalls road construction projects altogether. The findings are in congruence with the research by Hanim (2010) who found that shortage of skilled manpower cause delays in road construction projects.

The research also noted that the following challenges have a significant influence on skilled manpower in road construction projects; Shortage of manpower, lack of financial resources and high labour turnover, low level of education, lack of appreciation to the role of manpower development, lack of training program and high cost of manpower development. Further the study noted that skilled manpower is important, makes a firm competitive, and improves road agencies and contractors performance. The findings concur with the research by Trendle (2008) that indicated skilled employees perform quality work and can increase the number of clients/level of standards quickly in an organization.

The use of participatory techniques obviously lends its self to the participation of communities in both monitoring and evaluation of the impacts of the infrastructure on their lives. If the planning of a project is done using participatory techniques, such as ranking and mapping, the results can be revisited by the community and assessed next to the current situation. Therefore, indicators of change that can be explored further can be provided through using other participatory techniques.

The monitoring of community participation can be done by collecting information on activities such as number of meetings, and their attendance.

It is argued that if communities participate in the maintenance of transport infrastructure, not only would this be more cost effective but it would have important developmental spin-offs. These would include improved cash income opportunities, skill development and a greater sense of ownership which in turn sensitize the communities against activities that contribute damaging the infrastructure.

From the research it is clear that for community participation to be successful and sustained there needs to be large homogeneous groups within the community that accrue a benefit from having good roads. The community participates in maintaining the road to match its need for a particular level of access, e.g. dry season access for motorized transport. If sufficient people do not feel such a need for example if the majority of the people walk or headload crops to a nearby market, it is likely that the community will be reluctant to participate in ensuring that road maintenance projects are not subjected to damage by human activities.

In Kisii County, it is believed to be a political benefit to be in favour of investing money in building new roads. However, maintenance does not have the same status or does not give the same opportunity to stakeholders or decision makers to present themselves to the public. We have to create a platform for politicians and other decision makers where they can operate and get political benefit from arguing about the importance of maintaining the roads. I also think the Technology Transfer Centres should play an important role in dissemination of information about the consequences of neglecting the maintenance sector and present goods and practical solutions for proper maintenance.

5.4 Recommendations

From the research findings, the study therefore recommends the following:-

1. Setting up dedicated financing arrangements is a necessary to ensure that a sustainable and stable basic of road maintenance is established which translates to improved service delivery. It is equally necessary to ensure that: (i) commitment exists at all levels to make commercialized road management work; (ii) aggregate resources are sufficient to cover timely all parts of the road network; (iii) road user fees are based on the maintenance "needs" of the road network; (iv) KRB is appropriately constructed to ensure equitable representation of user interests; (v) a clear allocation of responsibilities exists between the RMLF administration and road agencies; and (vi) the road agencies have the capacity to carry out road maintenance works efficiently and effectively.
2. Road agencies and construction firms must be able to demonstrate their value as a career to the upcoming workforce. There are many ways that the construction industry can do so:-
    a) **Reaching out to the younger generations.** Construction firms need to partner with local schools to be considered by young adults as a career path worth pursuing. This partnership will lead to opportunities to appear at career events, speak in front of classrooms, appear on the school's career connection websites, and many other benefits. By visiting local high schools and colleges, construction firms will be able to get young adults thinking about a career in construction before they finalize their career path.
    b) **Investing in training programs.** To create a more highly skilled workforce overall, road agencies and construction firms need to invest in training for all employees. To do so, they should have extensive training for all new employees, refresher training courses for all-level employees, and mentorship programs that will allow the senior workers to pass along their knowledge to the younger working generation before they retire.

       In addition to skills training, road agencies and construction firms should also utilize training from the occupational safety and health administration in order to train new employees to improve safety on-site.

c) **Motivation of workers.** The need to remunerate the work force by better wages as per the labour law and regulations and provision of the necessary working tools and gears are vital for improved productivity in any organization.

3. Maintenance is a long-term activity, therefore if community participation has proved to be useful it needs to be sustained. For sustainability there needs to willingness on the part of the community as well as willingness on the part of the engineers, planners and other local officers. Local communities are totally dependent on a good road system. This willingness can be engendered in a number of ways the most practical are highlighted below:
   i) Even if there are regular meetings they will need an agenda of some substance. Maintenance activities lend themselves well to this, due to their cyclic nature. Therefore, the committee can be planning, implementing and assessing future and past activities. Again it is important that representatives from other organizations are there and contribute and guide the meetings agenda.
   ii) If the above activities are documented in meeting minutes that are copied back to your office, it ensures the meetings are monitored, the meetings take place and progress is checked.
4. Apparently, people in power think that prioritizing new constructions, new buildings or whatever, will result in political benefit and increased attention from the public, especially from the voters. The road agencies should use time and effort to inform local politicians on how to solve the road maintenance challenges. Also sensitize politicians on the consequences of adhering to best practices of allocating resources, procuring and award of road work tenders.

5.5 Suggestions for Further Research

1. A study should be conducted to involve more participants especially the other County Government departments like procurement, finance and environment as they also influence performance in road infrastructure projects.
2. A research on influence of political factors on performance of contractors will enhance further findings as this issue was identified by many respondents in the award of tenders.

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APPENDICES

Appendix I: Letter of Transmittal

Henry Karori Nyamache

P.O BOX 3037-40200

KISII

Dear Madam/ Sir,

RE: REQUEST FOR YOUR PARTICIPATION IN M.A. RESEARCH PROJECT

I am a student from the University of Nairobi pursuing a Master of Art in Project Planning and Management. I would like to carry out a research on factors influencing maintenance of road infrastructural projects in Kisii County.

This study is for academic purpose but will be useful for the stakeholders (Road agencies, NGOs, private and corporate institution involved in infrastructural projects in Kisii County).

Your participation in the exercise is voluntary and so you are free to choose to or not participate. But it would be helpful if you could participate fully.

The results of this research will be completely confidential and no personal issues of any respondent will be quoted in the report. Some of the questions I will ask may also be quite personal and I hope they will be okay with you. If, however, you do not feel comfortable answering any questions, please feel free to say so or seek clarification where you do not understand.

Yours faithfully,

Henry Karori Nyamache
L50/83555/2015

Appendix II: Questionnaire Road Agencies Employees and the Community

INSTRUCTIONS

1. The information give on this questionnaire will be held in strict confidence and will be used only for the purpose of the study.
2. If any of the questions may not be appropriate to your circumstance, you are under no obligation to answer

PART A: GENERAL INFORMATION

1. Please indicate your gender.
   A. Male ☐
   B. Female ☐
2. Please indicate your age from the categories below.
   A. 20-30 years ☐
   B. 31-40 years ☐
   C. 41-50 years ☐
   D. 51-60 years ☐
   E. Above 61 years ☐
3. Kindly indicate your highest academic qualification.
   A. Certificate ☐
   B. Diploma ☐
   C. Degree ☐
   D. Masters ☐
   E. Others (specify)……
4. How long have you worked in your organization/county?
   A. Less than 1 year ☐
   B. 1 year to 2 years ☐
   C. 2 years to 3 years ☐
   D. 3 years to 4 years ☐
   E. Over 4 years ☐

PART B: FACTORS INFLUENCING RURAL ROADS MAINTENANCE

A) FUNDING

1. Compared with funds allocated to other road agencies, how would you describe the amounts allocated to your organization/County?
   A. Inadequate ☐
   B. Slightly adequate ☐
   C. Adequate ☐
2. How many tranches are funds disbursed from Head Office for any project?
   A. One ☐
   B. Two ☐
   C. Three ☐
   D. Four ☐
3. How reliable are the funds received?
   A. Reliable ☐
   B. Unreliable ☐
   C. Sometimes reliable ☐
   D. Very unreliable ☐
4. When are the funds received?
   A. At beginning of financial year ☐
   B. Middle of financial year ☐
   C. End of financial year ☐
5. Kindly indicate any funding bodies including donors that you think are the sources of finances that your organization/county uses……..
   ……
   ……
6. Is there a particular road maintenance prioritization criterion from the ministry or KRB?
   A. Yes ☐
   B. No ☐

B) MANPOWER AND PERFORMANCE

1. In your opinion, what is the status of availability of skilled manpower in road construction and maintenance?
   A. Adequate ☐
   B. Inadequate ☐
2. Indicate the level of agreement on influence of availability of skilled manpower on performance of agency staff contractors in road projects. React on the items provided by using the Likert scale given. Please tick (√) appropriately: 1 = Strongly agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly disagree

Statements	1	2	3	4	5
Availability of skilled and semi-skilled labour helps to expedite the achievement of project goals hence performance of agency staff and contractors.					
Lack of semi and skilled labour delays or stalls altogether the performance.					
Skilled labour provides quality performance of construction projects.					
Skilled labour saves wastefulness of resources during construction and maintenance of roads.					

3. How significant are the following challenges on skilled manpower in road construction projects you have been involved? Please use the scale below to answer the following questions. Very significant challenges – (1); Significant challenges – (2); Neutral – (3); Not very significant challenges – 4; Not significant challenges – (5)

Statements	1	2	3	4	5
Shortage of manpower.					
Lack of financial resources.					
Cost of manpower development.					
Lack of appreciation to the role of manpower development.					
Lack of training program.					
High labour turnover.					
Low level of education.					

4. Do you have any recommendation for the development of skilled manpower in the road construction industry? Kindly indicate below……...

……

……

C) COMMUNITY PARTICIPATION

1. Do you think that the development projects undertaken in your locality have been implemented through participation of all community members?

   A. Yes ☐ B. No ☐

2. How was the idea about road maintenance projects?

No.	Opinion of the community on the water project	Yes	No
1)	The idea came from the community members.	☐	☐
2)	The idea came from the government.	☐	☐
3)	The idea came from the NGOs.	☐	☐
4)	I am not aware.	☐	☐

3. What form of contribution did the community give during project implementation?

   A. Monetary contribution ☐ C. Technical support ☐

   B. Manual labour ☐ D. Other (specify)…….

4. Who manages road infrastructure projects in this community?

   A. Local government ☐ C. Donors ☐

   B. Community ☐ D. Others (specify)…….

5. How is road infrastructure management appointed in this community?

   A. Democratic election ☐ B. Undemocratic election ☐

6. Are there trained experts in the area who can service the road infrastructure projects?

   A. Yes ☐ B. No ☐

7. Who initiate road infrastructure projects in this community?**.....**

   ……

   ……

8. (i) Is there partnership between community and the agencies during planning and implementation of road infrastructure?

   A. Yes ☐ B. No ☐

(ii) If yes, how has the control of the decision making in the project?

A. Donors ☐ C. Road users committee ☐

B. Government ☐ D. Don't know ☐

9. In a scale of 1-5, please rate the opinion of the community on the agency.

Opinion of the community on the Agency	1	2	3	4	5
Are communities actively involved in project planning and implementation of road infrastructure?					
Does the opinion of the community taken in planning, implementation and operation of road infrastructure.					
Do Agencies have absolute decision in every aspect of the project implementation and operation?					
Does the community have a sense of ownership of the road infrastructure?					

D) POLITICAL INPUT

1. To what extent has been the influence of politicians in regards to identification of road projects in your organization/county?

   A. None ☐

   B. Very minimal ☐

   C. Very much felt ☐

2. To what extent to local politicians influence on the award of Tenders?

   A. Sometimes ☐

   B. Always ☐

   C. Not at all ☐

   If your answer for above suggest there is some influence from politicians, kindly list below from the least to the most influential and give reasons as to why you think so.

   ……
   ……
   ……
   ……

3. What obstacles do you encounter when maintaining roads when the country is in political instability?

……
……
……
……

Appendix III: Chi-Square Critical Values

χ^2 (Chi-Squared) Distribution: Critical Values of χ^2

	Significance level		
Degrees of freedom	5%	1%	0.1%
1	3.841	6.635	10.828
2	5.991	9.210	13.816
3	7.815	11.345	16.266
4	9.488	13.277	18.467
5	11.070	15.086	20.515
6	12.592	16.812	22.458
7	14.067	18.475	24.322
8	15.507	20.090	26.124
9	16.919	21.666	27.877
10	18.307	23.209	29.588

Appendix IV: Kisii County Map