MAKERERE UNIVERSITY

C0LLEGE 0F ENGINEERING, DESIGN, ART AND TECHNOLOGY

SCHOOL OF BUILT ENVIROMENT

DEPARTMENT OF CONSTRUCTION ECONOMICS AND MANAGEMENT

FINAL YEAR PROJECT REPORT

TITLE

EVALUATION OF COSTS ON HIGHWAY PROJECTS

A FINAL YEAR RESEARCH PROJECT REPORT SUBMITTED TO THE COLLEGE OF ENGINEERING, DESIGN, ART AND TECHNOLOGY IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE IN CONSTRUCTION MANAGEMENT.

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DECLARATION

I NAKATUDDE DOREEN declare that the research work submitted in this report has not been submitted elsewhere or for any other work.

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APPROVAL

This is to certify that the report bearer, Nakatudde Doreen did her final year project Evaluation of costs on highway projects on the Kampala Northern bypass projectfrom August 2017 to June 2018and the report was submitted at Makerere University.

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I am greatly indebted to my project supervisor, Mr. Katongole Goerge for all his engagement, guidance and suggestions throughout the project process. My gift to him is to pray to the Almighty God bless and reward him abundantly.

The successful completion of this report has not been individual efforts but also help from other individuals.

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First, I thank God for the healthy life and protection he gave me during the research I did not receive any accidents or major healthy issues.

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Also, I extend my special thanks to the site engineers at COWI and employees for the cooperation and support offered to me during this periodas I gained vast technical knowledge and skills, experience, guidance and different kinds of advice during the training period with this the consultancy firm

DEDICATION

I dedicate this report to my father Mr. Ssewakilyanga James Hannington, my lovely mum Catherine Nakasujja, all my family members and friends.

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LIST OF ACRONYMS

KNBP – Kampala Northern Bypass

PAF – Poverty Action Fund

LGDP – Local Government Development program

UNRA – Uganda National Roads Authority

IC – Inter-change

EU- European Union

Ms – Micro software

PAPs- Project affected persons.

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ABSTRACT

This research was to evaluate costs on highway projects with the hope that it would help to establish whether the completed roads satisfy the objectives thus improvement of accessibility to social services, reduce on time of travel from one area to another, reduce on vehicle operation costs, boost household income and poverty. Despite the government's and donor efforts to fund road projects through their support to LGDP, PAF and conditional grants, there has been no report to establish whether the objectives above have been fulfilled.

The assessment was based on five evaluation criteria these were efficiency (in terms of time and resource usage), effectiveness (in terms of extent of goal achievement for tendering), relevance (in forms of needs and priorities), impact (negative and positive) and sustainability (operations and maintenance work on projects).

Five sections along the KNBP were randomly selected, funded by EU and supervised by the client's representative (COWI) representing UNRA which the government organization responsible for the construction and maintenance of roads in Uganda. The sections selected included; Busega West end, Sentema IC, Hoima IC, Gayaza IC and Kyebando-Ntinda IC.

Information regarding the efficiency criterion was obtained from the client's representative records, the project engineer's office. The data regarding the criteria thus, effectiveness, relevancy, impact, sustainability, was collected by aid of questionnaires. The respondents for the questionnaire were the project engineers, site inspectors and the road users. The data collected was analyzed as given in the relevant chapter.

Recommendations were made basing one the data collected from the client's representative records and observations from the information obtained from the questionnaire survey and analysis. in conclusion, generally of the four roads evaluated, 40% of the roads were executed at the planned cost, time frame and quantity, 60% were established to have attained the intended objective. All of the roads were needs satisfaction of the stakeholders and the maintenance mechanisms in place are

inadequate. The key recommendations include, Enhancement of appraisal, community participation and sensitization during the planning of the project and maintenance be given a sufficient budget and priority.

For the detailed information and data, proceed to the next section.

CHAPTER ONE

1.0 Introduction

This chapter discusses the background to the project, its objectives, problem statement, justification, scope of research, and methodology. The following sections discuss each of the above in details.

1.1 Background

Highway projects have historically experienced significant construction cost overruns from the time the decision to build has been taken by the owner. This research addresses the problem of why highway projects overrun their predicted costs. It identifies the owner risk variables that contribute to significant cost overrun and then uses factor analysis, expert elicitation, and the nominal group technique to establish groups of importance ranked owner risks. (Garry D Creedy, 2010)

The success of any project is not determined on the final outcome but rather on every aspect of the project chain based on time, resources, sustainability, innovation, and value for money.

Project failure rates in developing countries tend to be high due to the nature of different hitches that come up at every stage, some of which could have been ignored at the start. Construction is not only about availability of resources, feasibility studies and manpower but also a combination of several competing factors, all of which can lead to the success or failure of a project. Needless to say, some projects fail because of flimsy issues which could have been ignored during the planning stage. (Kumares C Sinha, Samuel Labi, 2011)

Recent studies in Uganda show that the success rates for road projects is worrying with up to 90% of all projects being reported behind schedule. Some projects exceeded their duration period up to three times beyond the estimated time of completion. Time and cost overruns in most projects are common especially in developing countries. However, time comes when they threaten the very nature of project designs thus overriding the whole essence of project design and planning. When not addressed, it becomes a norm with both the project owners and contractors taking a laid-back position and not doing enough to complete projects. In the construction sector of an economy, it is important that projects are completed on time to spur the confidence of sector players to adhere to stipulated timelines. This in the long run becomes a culture that everyone respects. (Kumares C Sinha, Samuel Labi, 2011)

The idea of KNBP was conceived in late 1990s to create a ring road on the northern part of the city, which would later alone form part of the outer belt of Kampala city, linking with the southern bypass connecting between Busega, through the suburbs of Munyonyo on to Kireka. Actual construction could not commence until 2003. The 21km road starting at Kireka and ending at Busega. The project was funded by European Union up to a tune of 60 million Euros. As expected the first hurdle of the project was to acquire the right of way by compensating project affected persons (PAPs). In anticipation of the project, the prices of land in the area more than doubled. Majority of people acquired land expecting to cash in through tubby recompenses that were being paid.

After the project has been put in place, there is need to evaluate its efficiency (in terms of cost, quality and quantity), effectiveness (extent of achievement of objectives), impact (effects of the project), relevancy (its useful ness in terms of needs and priorities to users/ community) and sustainability (find out whether there is maintenance and operation mechanism) when it is in service. The feedback of the project has to be ascertained from the users and to some extent the project managers. This research therefore, is based on highway projects, which provide accessibility to the required services to the users.

Evaluation is essential for improvement of effectiveness of any project. It also enables project managers to understand and demonstrate the results of their work, determine the best strategies for achieving their goals and document lessons learned to improve future programs.

1.2 Problem statement

Although highway projects in Uganda have been planned, budgeted, funded and implemented, no performance assessment of the roads regarding the design objectives has been done.

1.3 Objectives of the study

1.3.1 Main objective

To evaluate construction costs on highway projects.

1.3.2 Specific objectives

1. To establish the efficiency in terms of cost and quality of the projects.

2. To establish the effectiveness in form of extent of goal/ need achievement.
3. To establish the relevancy in terms of needs and priorities of the projects.
4. To establish the sustainability mechanism of the highway projects.
5. To establish the negative and positive impacts of the projects.

1.4 Justification

The government of Uganda receives funds from the European Union and World Bank in form of PAF, conditional grants, LGDP and donations to construct, maintain and rehabilitate highways. Despite this increased funding and number of kilometer coverage, there is still a public outcry of poor performance and limited existence of the infrastructure in the country hence the need to evaluate cost on highway projects.

1.5 Scope

This study was limited to the Kampala Northern Bypass highway (KNBP). The research focused mainly on the efficiency (in terms of cost and quality), effectiveness (extent of objective achievement), impact (negative and positive), relevancy (needs and priority) and sustainability (maintenance mechanism) of the highway projects in Uganda.

1.6 Methodology

The objectives of the assessment of construction cost estimates on highway projects were achieved by adopting the following procedure;

- Literature review
- Data collection from different road projects.
- Structured questionnaires
- Questionnaire aided interviews.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter consists of definitions of key words in the research, project model, outline of project stakeholders, types and purpose of evaluation, approach to the evaluation, parties to an evaluation, evaluation criteria used in the research and its measurement mechanisms.

2.2 Definitions

A **project** is a set of activities, limited in space, time and scope which is to achieve specified objectives. It is also defined as a means to achieve a goal by applying a certain amount of resources. (Knut, 2003)

Evaluation is defined as systematic, analytic study conducted occasionally to answer specific management questions about performance. It is similarly defined as being an assment, as systematic and objective as possible, of an ongoing or completed project. (Knut, 2003)

Project evaluation is the control of the planning and implementation of project activities with regard to the objectives to be achieved. (Knut, 2003)

Stakeholder is an agency or organization or individual who has a direct or indirect interest in the project. Also, can be that, who affects or is affected positively or negatively by the implementation of the project. (Knut, 2003)

Beneficiaries are individuals that are intended to benefit from the project or the targeted group plus others that might benefit.

Ex-ante evaluation is that evaluation carried out before implementation of a project. It is in most cases known as appraisal. (Knut, 2003)

Ex-post evaluation is an evaluation that reviews and judges a project when it has been implemented to completion. (Knut, 2003)

Summative evaluation is an evaluation conducted at the end of implementation usually carried out by external evaluators to justify a project. (Knut, 2003)

Goal is a sector objective to which a project contributes. It is commonly known as strategic objective. (Knut, 2003)

Indicator is quantitative or qualitative variable that provides a simple and reliable basis for assessing achievements or performance of a project. (Knut, 2003)

Performance is the degree to which a project operates according to standard quality.

Cost effectiveness is the comparison of the relative costs of achieving a given output by different means where benefits are difficult to determine.

2.3 Project model

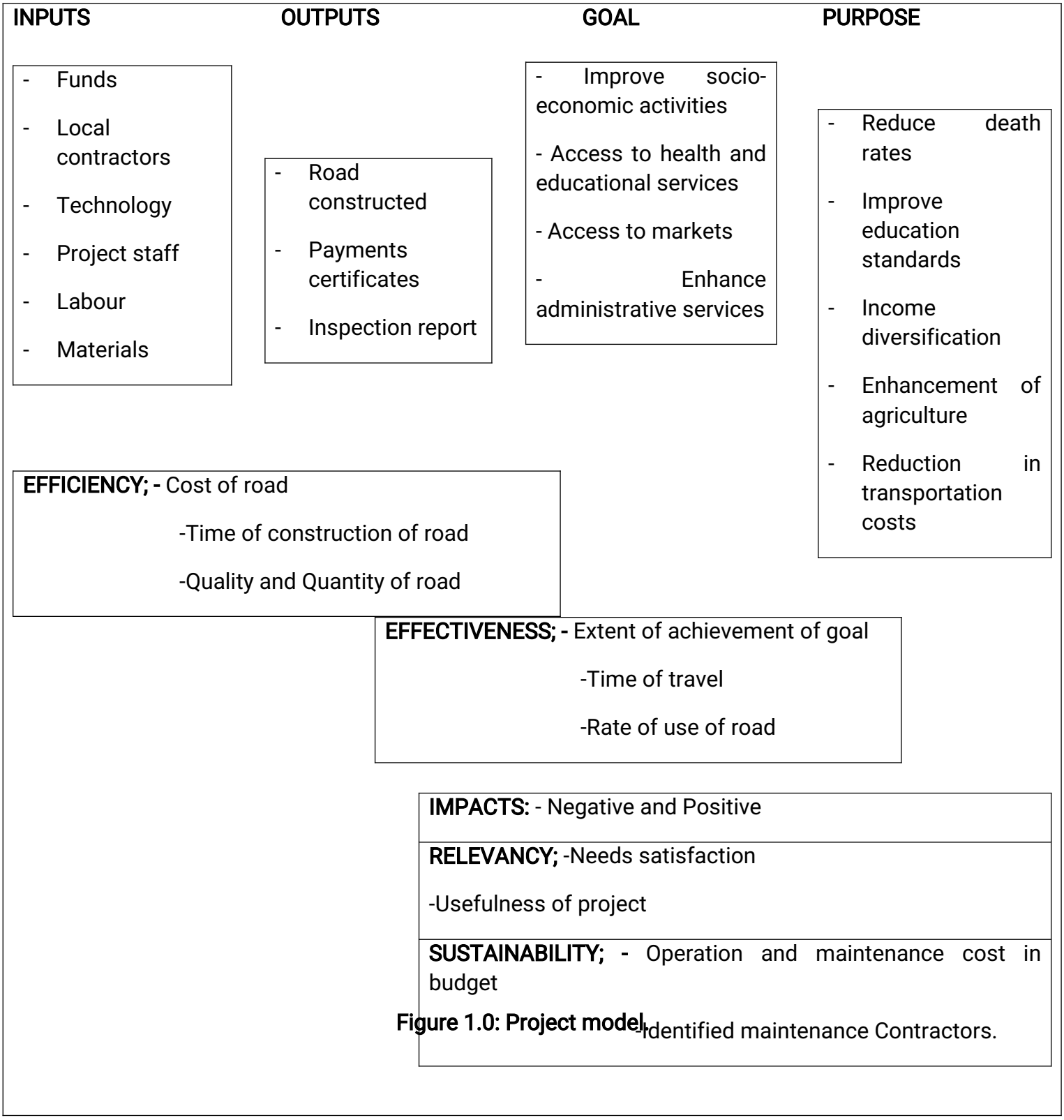


Figure 1.0: Project model

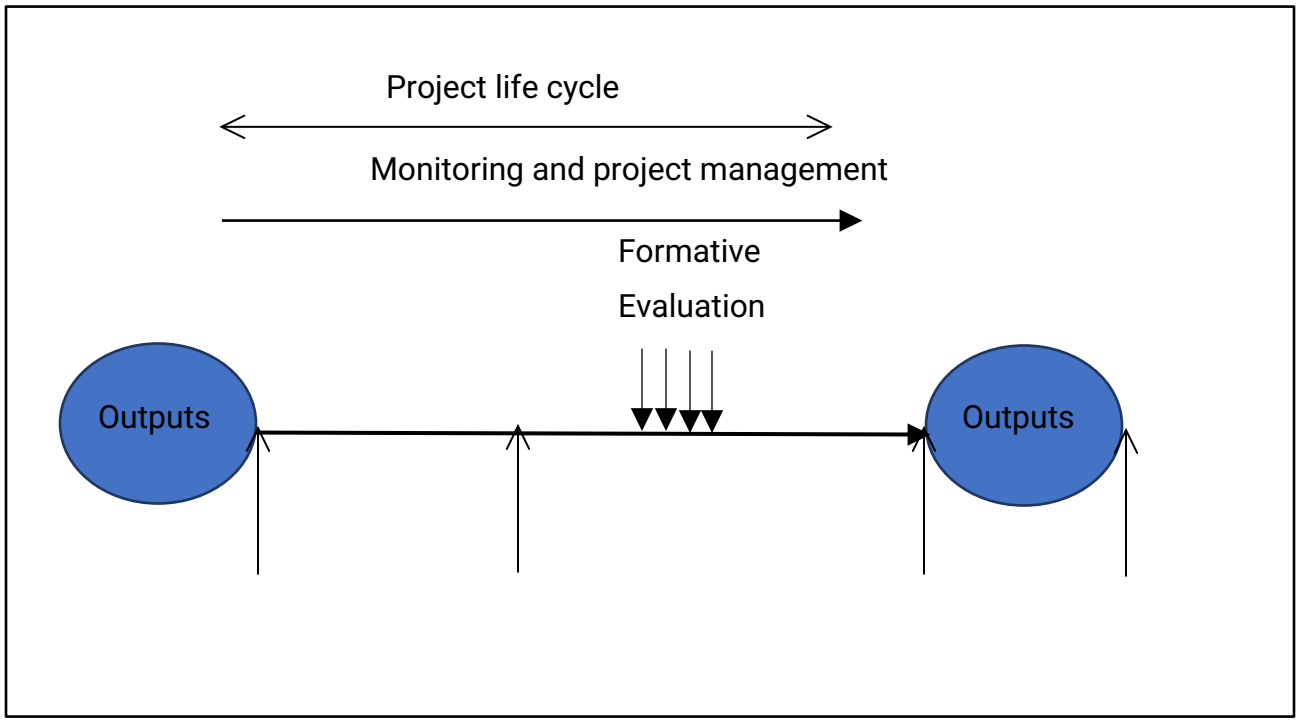
2.3 Project stakeholders

Project stakeholders are individuals or organization who are actively involved in the project or whose interest may be positively or negatively affected by the project (Knut,2003). The key stakeholders in a project include the following;

- Financing party – this is the party, which initiates an interest in the long-term effect of the project. Its termed as developer or financier of the project.
- Operator-is the one responsible for implementation of the project either by contract or on their own behalf. He focuses on project output and is termed as implementing party, contractor or project manager.
- User-is the primary user of the services of the project and focuses on the project goal. He is termed as target group, customer or beneficiary.

2.4 Evaluation

It can be defined as systematic, analytical studies conducted occasionally to answer specific management questions about performance. It is used to establish the outcome of processes and activities. In a project execution, it is applied during the project cycle. It can be done before, during or after the project as illustrated in figure 2.2



Appraisal	Interim evaluation	End evaluation	Ex post evaluation

Figure 2.2; Evaluation enterprise

2.4.1 Types of evaluation

Evaluation is a management tool that is used to find out about the past in order to improve upon future performance. There are two main types of evaluation (Knut, 2003)

- Summative evaluation, which is used to establish performance or achievement, at the end of the project implementation with the aim of finding out the past and to emphasize on the degree of success or failure. The evaluators are usually impartial and independent.
- Formative evaluation is an evaluation that is used for examining and changing processes as they happen with aims of improving future performance and emphasize on reasons for success or failure. The evaluators usually are the stakeholders' representatives and external evaluators.

2.4.2 Approach to evaluation

There are two main approaches to evaluation (Knut, 2003) thus; goal medal and process model. Goal evaluation involves assessment of the effects of the project in relation to the objectives given, while process evaluation involves the assessment of the way the project functions and its consequences.

2.4.3 purpose of evaluation

The evaluation purposes are related to how evaluations are to be used and who are the intended users of the evaluation findings and results. The purposes of project evaluations can be summarized as in the figure 2.3

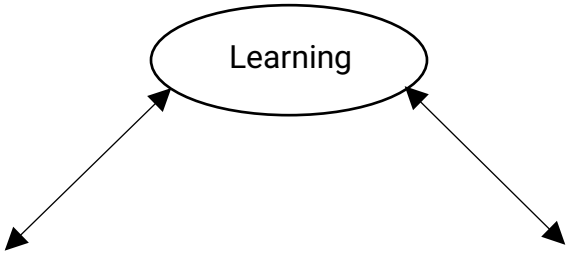


Figure 3; Purposes of evaluation relationship.

- Management of project processes improves the performance of the projects.
- Control helps in provision of evidence as to the usability, cost-effectiveness and value addition of the project.
- Learning of achievements or failures of the project contributes to the establishment of causes and effects of the project, useful for future projects.

2.4.4 Parties to an evaluation

For an evaluation to be successful, it is based on cooperation between key participants and the interest of different parties involved in or affected by the evaluation. The main parties to an evaluation (Knut, 2003) include;

- The commissioning party; is the financing party or key stakeholder involved in or affected by the project. For example, in this particular research the commissioning party is the European Union
- The evaluator; organization or individual collecting and analyzing data and judge the value of the evaluated subject. Taking an example of this research, I take up the responsibility of the projects evaluator.
- The user; may be the financing party, implementing organization, policy makers, public authority, audit and all the parties with a formal role to the project. In this particular research, the donors, Government of Uganda, Auditor general and others are taken as the example of the users of this evaluation.
- The stakeholders; are individuals or organizations that have an interest in the project being evaluated and its findings. The officials from UNRA and client

representatives (cowi) and the community are in this case the stakeholders of this evaluation.

2.4.5 Evaluation criteria

There are five evaluation criteria (Knut, 2003), which provide a comprehensive and simple picture of the status of the project. They are generally applied investigative measures which may be used on all levels of a project. These five criteria when used in combination provide the essential information and hints to make correct conclusions and draw up lessons concerning the project. The five criteria used in evaluation of the project are;

- **Efficiency;** This is a measure of how economically inputs like funds, time, human resource, material and others are converted into outputs. It compares inputs against outputs.
- **Effectiveness;** This is a measure of the extent to which a project has attained its objective at the goal or purpose level. This evaluation criterion focuses only on specific positive planned effects expected by the parties involved and is expressed in terms ofthe tactical objectives.
- **Impact;** This is an evaluation criterion that focuses on both positive and negative consequences of the project.
- **Relevance;** this is an overall assessment of whether a project was kept within needs and priorities of the client, intended users and other parties.
- **Sustainability;** Is an indication as to whether the positive impacts are likely to be maintained after the completion of the project.

2.4.5.1 Measurement/assessment of evaluation criteria.

Efficiency

The efficiency measurement was in terms of cost, quality and quantity of producing those outputs (road construction) as compared with budgets and plans.

A complete overall assessment for the implemented projects was considered. Efficiency measurement establishes whether the project is being done cheaply, with required quantity and good quality. It also gives the degree of agreed project output that has been achieved.

Effectiveness

Measurement of the effectiveness of the project were in terms of whether the project provides adequate need for the beneficiaries and is suitable for the needs of its users in relation to the planned and expected. Effectiveness measurement enables to establish the extent the agreed project objectives have been achieved.

According to some of the highway projects established in the past, the following were the objectives/goals for rehabilitation of road projects.

- To improve accessibility to social services.
- To reduce on time of travel from one area to another.
- To reduce on vehicle operation costs.
- To boost household income.
- Poverty reduction.

In this research therefore, measurement of effectiveness was based on the above objectives for the randomly selected feeder roads to be evaluated.

Impact

The measurement of impact was in terms of the social, economic or environmental benefits or demerit resulting from executed projects in accordance to the users, community and stakeholders. Positive and negative impacts as a result of project implementation were established and these include;

Positive impacts

- Social-economic growth

- Infrastructure development and poverty reduction.
- Access to trade markets.
- Reduction in prices of goods and fares.
- Non-Farm Employment and Income Diversification.
- Change in social life.
- Improvement of women income and gender emancipation.
- Improved health status and nutrition.
- Improvement of education standards.

Measures of maintaining the positive impacts.

For the purpose of maintaining the positive impacts of the road projects, the following are required;

- Involvement of both men and women in road maintenance
- Increased budget and feasibility study
- Construction of health centers and schools.
- Involvement of community in pre-planning and maintenance of the infrastructure
- Asset inventory and condition assessment
- Monitoring and evaluation.

Negative impacts

- Environmental degradation.
- Loss of land
- Inadequate compensation costs.

- Pollution in form of dust.
- Excessive speed resulting into accidents.

Mitigation measures for negative impacts.

For the purpose of mitigation of the negative impacts of the road projects, the following measures are required;

- Planting grass in borrow areas.
- Purchase of marram in already gazette borrow areas.
- Compensation and gazetting of more borrow areas.
- Provision of rubble strip / humps in trading centers and near schools.
- Gazetting of road reserve areas.
- Budget provision, enhance field appraisal and planning.

Relevance

The research measures relevancy in term of suitability of relationship of needs and priorities. It gives the extent the objectives of the project correspond with the priorities and needs of the community and users. It also expresses the discrepancy between the formally agreed objectives and community needs. Relevance establishes whether objectives are kept within needs and priorities. In this context, research establishes the relevance of the road projects using the following parameters.

- Whether the road was the basic need and priority of the community or users in the area.
- Whether the project was executed in the way the client or users expected.

Sustainability

Measurement was in terms of whether the project has ever been maintained since its completion. The evaluation was concerned with what has happened after the project

was completed.

For the project to be economically viable, it is important that there should be a maintenance measure put in place in order to serve the community for the design period (Knut, 2003)

In this research, sustainability was established in form of;

- Availability of maintenance budget.
- Presence or record of labor-based workers or contractors identified to maintain the road.

2.4.6 Information process and flow

The information flow process that took place during the evaluation is summarized in figure 2.4

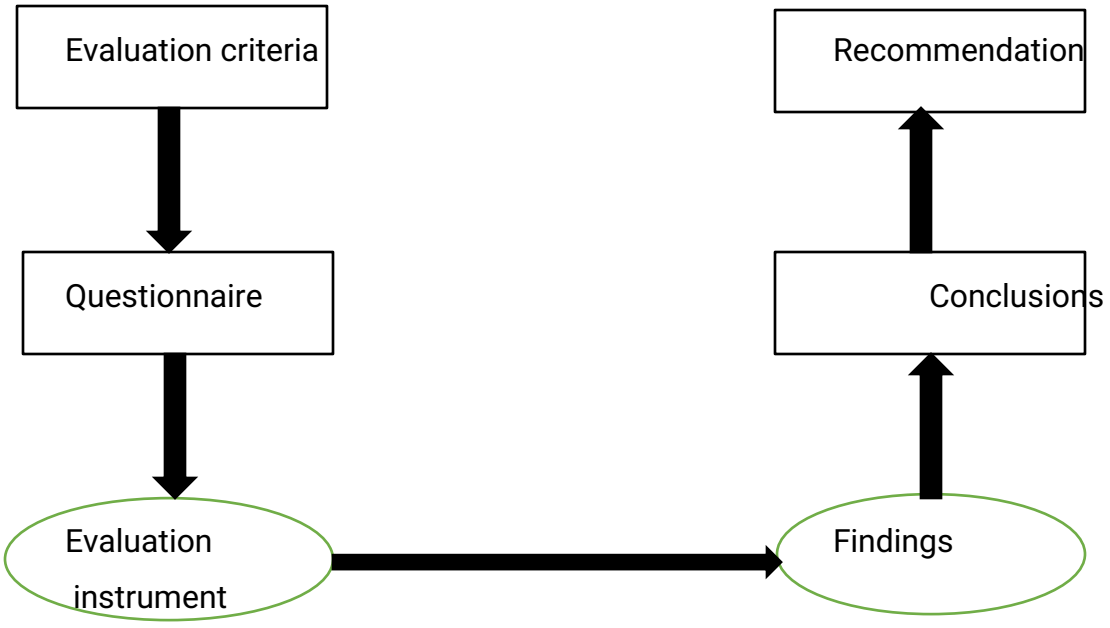


Figure 4: Evaluation information flow.

2.4.7 Evaluation procedure

The following steps were adopted as the evaluation procedure.

Step 1: Establishment of the project strategy.

This involved the establishment of project strategies in terms of inputs and objectives.

Step 2; Reviewing the project strategies

This involved reviewing objectives and establishment of whether they are realistic and achievable as compared to agreed objectives.

Step 3; Identification of evaluation questions.

This particular evaluation focused on five evaluation criteria thus, efficiency, effectiveness, impact, relevance and sustainability. These together represented the key issues that are addressed in order to provide a basis for decisions of improvement of a projects' performance.

Step 4; Ensuring adequacy of evaluation instruments.

This involved evaluation question and the data collection method in combination. The evaluation questions specified the information needed in the research.

Step 5; Collection and analyzing information

Two methods are used to collect data thus; existing data method, which involves examination of the available documents concerning the projects, and formal surveys, which involves questionnaire and questionnaire guided interviews.

Step 6; Making the overall evaluation.

At this stage, a number of answers are generated to evaluate questions and further aggregated them in the form of series of specific conclusions. The evaluation provides a basis for overall conclusions and for drawing up a strategy for future.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

In this chapter, project selection and evaluation instruments are discussed. To evaluate the costs on highway projects in particular the Kampala Northern Bypass and its performance funded by the EU and supervised by COWI as the client's representative and the client being UNRA.

3.2 Project selection

The project to be analyzed were randomly selected using random sampling method. There are two types of sampling (Kothari, 2002) that is probability sampling and non-probability sampling. Probability sampling which is also known as random sampling or chance sampling was used in the selection of the parts (road sections) to be evaluated. Each element of the finite population was written on a slip of paper, mixed them thoroughly in a container and drew out a sample one after the other without replacement. The finite population was the names of the road sections part of the project that were executed in the past three financial years and out of which five sections were randomly selected.

The method of random sampling was considered because;

- Every item of the population (in this case finite population) has equal chance of inclusion.
- The results obtained can be assumed in terms of probability hence significance of results can be obtained.
- Ensures the law of statistical regularity which states that if on average the sample chosen is a random one, the sample will have the same composition and characteristics as the population (Kothari, 2002)

- Data can be easily analyzed.

3.3 Evaluation instrument

In order to carry out the research, the following evaluation tools were adopted.

- Information from the client's representative.
- Use of structured questionnaire
- Use of questionnaire guided interview.
- Observation study.
- Analysis of data.

3.3.1 Information from the client's representative records

The files from the client's representative records (engineers' office) were used to obtain the data for the selected sections of the project. The data from the records was used for the analysis of the efficiency of the project.

The relevant information picked included; cost, quality and quantity of the project. The information was tabulated as shown in the table below and then represented in a graphical form.

Funding/FY	Project Name	Length (km)		Cost (Ushs)		Period (Months)	
		Planned	Actual	Planned	Actual	Planned	Actual

Table 1: Efficiency data presentation form.

3.3.2 Aid of structured questionnaire

A structured questionnaire was used to collect the information required for the research.

This instrument was used to obtain information of the evaluation criteria like effectiveness, impact, relevancy and sustainability.

The target groups of the questionnaire were stakeholders such as the engineering staff and the site inspection officers.

3.3.3 Questionnaire aided interview

The structured questionnaire was subjected to stakeholders, users, local community and other members at the sites like the foremen who cannot fill or interpret the questionnaire with ease. This instrument was used to obtain information of the evaluation criteria of effectiveness, impact, relevancy and partially sustainability.

3.3.4 Observation study and data collection

While using the questionnaire some of the questions seeked the opinion of the respondent. This was used as the observed information.

There are two types of data thus primary and secondary data (Kothari, 2002). Primary data is data collected afresh and for the first time while Secondary data is data which has been already been collected by someone else and has passed through the statistical process. There are several methods of collection of primary data. (Kothari, 2002) these include; observation method, interview method, questionnaire methods and others.

In the research, the questionnaires were used. They were given to the persons concerned with the request to answer the questions and return them hence the data was a primary type. For the method of collection, a combination of observation, interview and questionnaire method was used.

3.3.5 Analysis of data

Analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data group.

The data obtained from the questionnaire was analyzed basing on certain scale and

then converted into statistical data.

3.3.5.1 Measurement scale

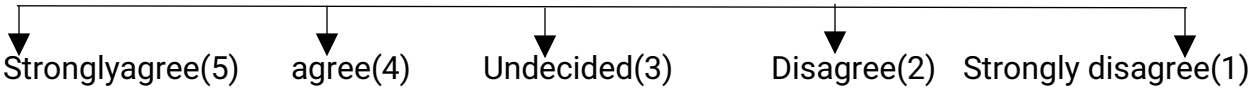
Measurement can mean the process of assigning number to objects or observations, the level of measurement being a function of rules under the number were assigned. (Kothari,2002).

Scaling is defined as a procedure for the assignment of members (or other symbols) to a property of objects in order to impart some of the characteristics of numbers to the properties in question (Kothari, 2002). There are different scales for measuring attitudes namely arbitrary scales, differential scales, summative scales, cumulative scales and factor scales. (Kothari, 2002)

In the research, the used factor of scales is known as summated scale (Likert scale).

Summative scales (Likert scales) are developed by utilizing the item analysis approach.

Summative scales consist of a number of statements which express either a favorable attitude towards the given object to which the respondent is asked to react. The scale used is illustrated in the figure below with scales. (scores)



3.3.5.2 Processing and analysis of data

Processing implies editing, coding, classification and tabulation of collected data so that they are agreeable to analysis. Processing operation will involve;

- Editing of data; which is the process of examining the collected raw data to detect errors and omissions and correct them where possible. It involves careful scrutiny of the completed questionnaire.
- Coding; refers to the process of assigning numerical or other symbols to answers, so that responses can be put into limited number of categories or

classes. The coding method used was to write down the data from the questionnaire to a coding sheet.

- Classification is a process of arranging data in groups or classes on the basis of common characteristics. The data having a common characteristic was placed in one class and this way the entire data was divided into a number of groups or classes. The type of classification used involved classification according to attributes thus basing on common characteristics for example relevancy, sustainability and effectiveness.

- Tabulation is the procedure of arrangement of massive data in some kind of short and logical order. It is a process of summarizing raw data and displaying the same in compact form thus in form of statistical table for further analysis.

3.3.5.3 Reliability testing of data

The data obtained from the questionnaires were tested for reliability by computation of Cronbach's coefficient of reliability alpha (**α**). It measures how well a set of items (or variables) measures a single unidimensional latent construct. When data has a multidimensional structure, Cronbach's coefficient is usually low.

Cronbach's coefficient of reliability can be written as a function of the number of test items and the average inter-correlation among the items as in equation 3.1

$$\alpha = \frac{N \times \mu}{1+(N-1)\times \mu}$$

Where; **N** is equal to the number of items and **μ**is the average inter-item correlation among the items. A reliability coefficient of 0.08 or higher is considered as "acceptable" (Nunnaly, 1978)

CHAPTER FOUR

4.0 DATA ANALYSIS, RESLUTS AND DISCUSSIONS.

4.1 Introduction

This chapter discusses questionnaire data, the responsiveness to the questionnaire, testing for reliability of survey data, assessment of results, records data and summary of findings.

The target groups of the questionnaire were stakeholders such as the engineering staff and the site inspection officers. The structured questionnaire was subjected to stakeholders, users, local community and other members at the project sites like the foremen who cannot fill or interpret the questionnaire with ease.

Respondents were found either in their offices or in the areas of location of the project. The research was to assess the cost estimates of highway projects. The evaluation was restricted to five evaluation criteria these were efficiency, effectiveness, relevance, impact and sustainability of the executed road projects.

4.2 Questionnaire data

Fifty (50) people were randomly selected to participate in the field survey and the questionnaires for each road were considered in the evaluation. The summary of their response to the questionnaires is given in the table 2.

Table 2: Questionnaire response summary.

Selected road sections	Number of questionnaires administered	Number of questionnaire repondents	Percentage of response
Gayaza IC	50	42	84
Busega West end	50	43	86
Hoima IC	50	46	92
Sentema IC	50	46	92
Kyebando-Ntinda IC	50	37	74

Hence the number of questionnaire respondents for each road were considered in the field survey analysis.

4.3 Reliability test of survey data

The data obtained from the questionnaires were subjected to the reliability test by computation of Cronbach's coefficient reliability alpha (α). Using the equation 3.1, Cronbach's coefficient of reliability (α) was computed.

From the data shown in **Appendix B,** N= 8, μ=2, hence α =1.07

A reliability coefficient of 0.80 or higher is considered as "acceptable" (Nunnaly, 1978).

Therefore, the survey results obtained from the various respondents are liable since α =

1.07 >0.80 the acceptable.

4.4 Assessment of results

Computer software like SPSS and Ms excel were utilized to ease the weight task of analyzing each questionnaire. The answers to the structured questions in the questionnaire were coded, entered in a coding sheet shown in Appendix B. Then an output of frequencies for each road section was obtained and summarized as in Appendix C and percentages were automatically generated corresponding to the number each particular respondent appeared in the questionnaires. The coding was necessary because a variety of answers applied to the individual structured questions.

For the case of data obtained from records, it was straight away tabulated in accordance to cost, quantity (planned against actual)

4.5 Secondary data results.

4.5.1 Analysis of results from records.

The deviations between the planned and actual efficiency parameters were computed and the results are given in table below.

Table 3: Efficiency analysis of records.

Road section	EFFICIENCY OF PARAMETERS		
	COST	TIME	QUANTITY
Gayaza IC	-1.4%	-11.1%	0%
Busega West end	-16.8%	0%	0%
Hoima IC	11.3%	25%	0%
Sentema IC	37.3%	0%	-9.1%
Kyebando-Ntinda IC	42.2%	0%	0%

4.5.2 Discussion of efficiency results.

Gayaza IC and Busega West end sections were 70% completed at lower cost than planned and within the expected time frame. This implies that these road sections were efficient in terms of cost, quantity and quality.

For Hoima IC section, the actual cost and time exceeded the planned. The reasons given by the project manager for the increases were;

- Change in diameter of culverts from 600mm diameter to 1200mm diameter in some locations.
- Increase in number of culvert lines.

As a result of deviations from the planned costs, quantity and quality, there was no efficiency on this section of the project in terms of cost, quality and quantity. This is because all the factors given for the increase would have been forecasted before the implementation of the project if a comprehensive appraisal was carried out.

In the case of Sentema IC road section of the project, there was increase in actual cost and reduction of quantity of work done. The reasons given for the anomaly were;

- Change in road alignment
- Increase in the number of culvert lines.

Therefore, efficiency in terms of cost and quantity for this section was not there since there was deviation from the planned parameters. The reasons for anomaly would have been foreseen at the planning and budgeting if asset inventory and condition assessment were carried out accurately. Similarly, the alignment is usually determined before budgeting and implementation. Also since there was reduction of quantity of work executed, it would be expected that the omission could counter balance with the additional work thereby reducing cost.

Finally, on Kyebando – Ntinda IC section of the project, there was increase in cost from the planned amount. The reason given was that, there was need to construct a foot bridge on the road if it was to serve its intended purpose. The purpose of the foot bridge

was to connect the two communities through which the road was passing. This was a clear indication that there was no asset inventory carried out on the road. As such, the road project was not efficient in terms of cost.

4.6 Responses to the questionnaire

Response obtained from each road using the same modal of questionnaires, were analyzed separately road per road. The results from the questionnaires are given and discussions in the next section. The questionnaire uses in this research is given in the Appendix D.

4.6.1 Questionnaire results.

Question No.1:- The respondents were asked how they rank the particular roads in terms of importance by answering whether it was the most useful or useful or not useful. It was aimed at establishing the relevance of the road project. The results of the responses obtained are given in the table below.

Table 4: response to question no.1

Road Section	Percentage response per questionnaire option		
	Very useful	Useful	Not useful
Gayaza IC	55	45	-
Busega West end	44	56	-
Hoima IC	61	39	-
Sentema IC	57	43	-
Kyebando-Ntinda IC	46	54	-

The importance of the road as per the responses is analyzed in the figure 4.1

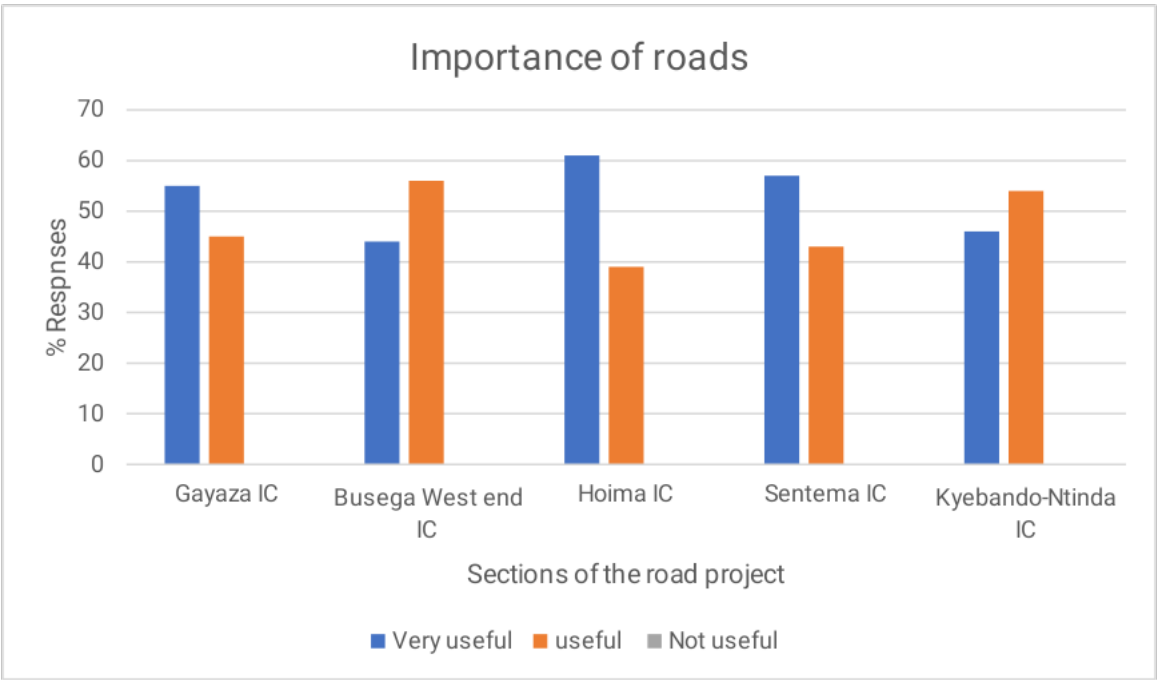


Figure 5: Comparison of road importance

From figure 5, it is evident none of the roads was not useful indicating that all these roads were relevant to all the stakeholders. The combination of the percentage of respondents who considered the roads to be very useful and useful gives 100% relevance of the roads in the area.

Question No.2:- The respondents were asked to answer whether the road was the most needed project in the area by ticking Yes or Unsure or No. the question was similarly used to measure the relevance of the road. The results obtained from various respondents are given in table below and the subsequent analysis is in figure below showing the need of the road projects in the area.

Table 5: Response to Question No.2.

Road Section	Percentage response per questionnaire option		
	Yes	Unsure	No
Gayaza IC	95	5	0
Busega West end	95	5	0
Hoima IC	98	2	0
Sentema IC	96	2	2
Kyebando-Ntinda IC	92	5	3

The results are analyzed using a bar chart in figure 6.

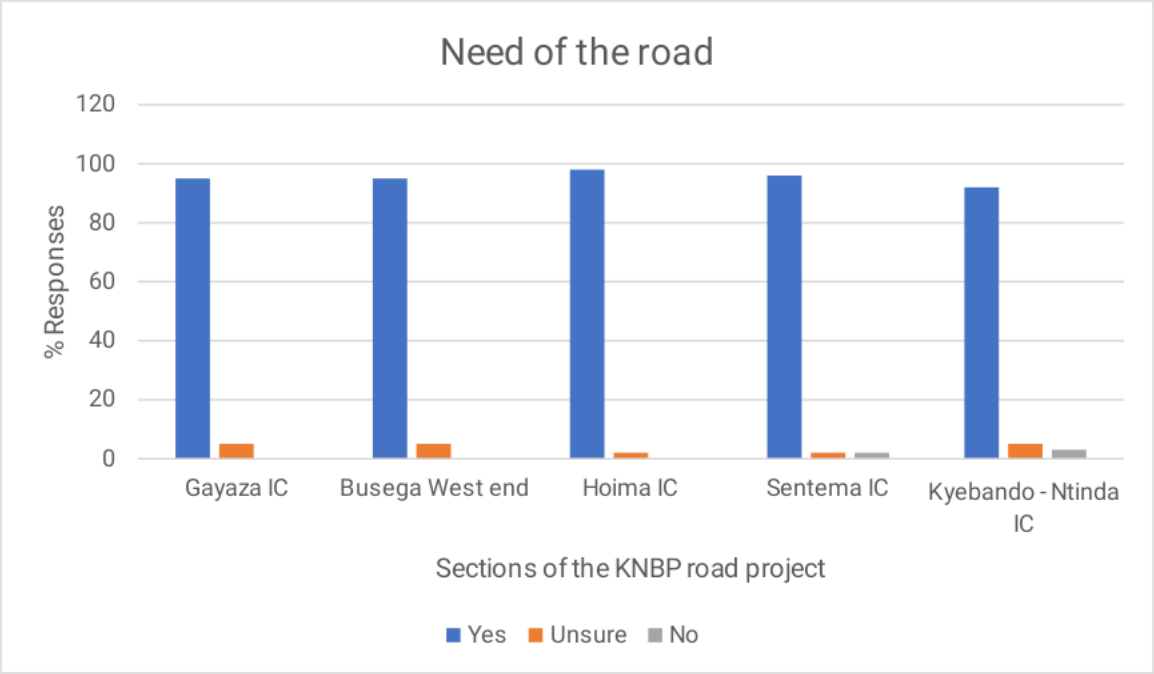


Figure 6: Need of the road project.

Basing on the above analysis, for each of all the five roads over 90% respondents

agreed that the roads were very much needed in their area hence, these roads were relevant to the stakeholders.

Question No.3:- This question asked for the existence of the budget for maintenance of the road and the respondents were expected to answer by ticking a Yes or Unsure or No.

It was targeted at establishment of whether sustainability mechanism is in place. The results obtained from the respondents are given in the table below and subsequently figure below shows the analysis summary of the results of the five road sections.

Table 6: response to question 3

Road Section	Percentage response per questionnaire option		
	Yes	Unsure	No
Gayaza IC	50	38	12
Busega West end	61	30	9
Hoima IC	35	48	17
Sentema IC	39	48	13
Kyebando-Ntinda IC	51	30	19

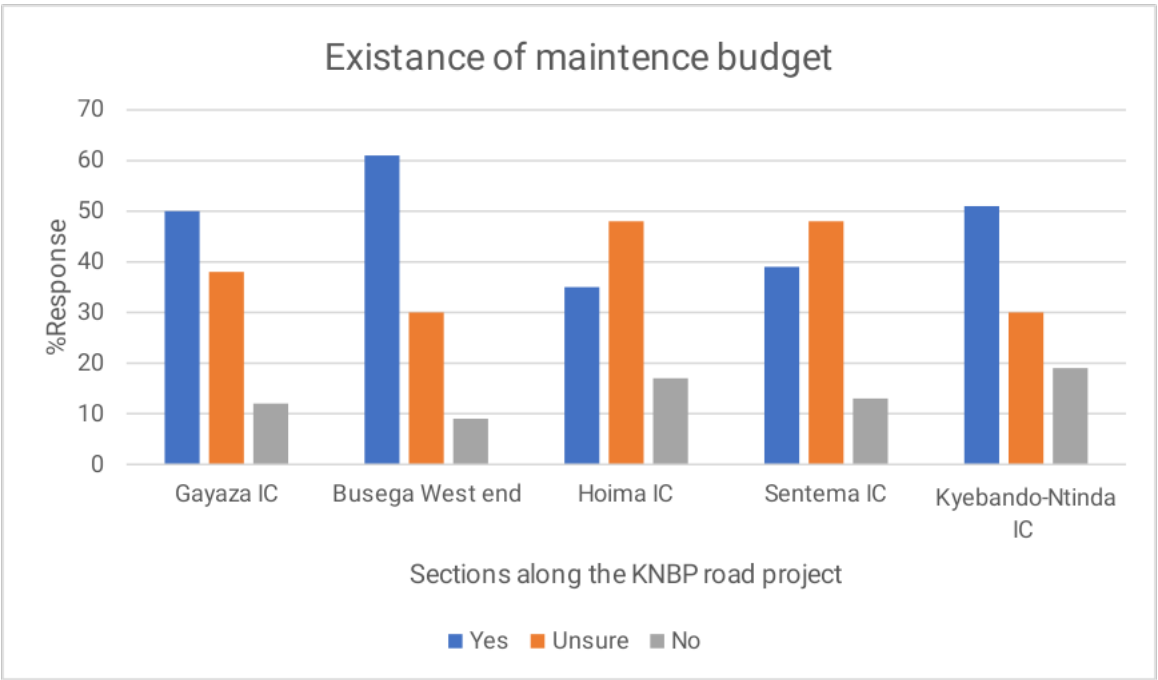


Figure 7: Maintenance budget existance

The results of this question indicate that the budget for the maintenance of the road is either inadequate or is not there. On Hoima IC and Sentema IC sections, most respondents were unsure meaning that since the completion of the project implementation, they have not observed any maintenance on the road resulting in a conclusion that there was no budget. However, if both the respondents who answered **"yes", "No"** and **"Unsure"** are combined, they out weigh those who are sure there is a budget for maintenance of the road. This implies that the sustainability mechanism in terms of budget is sufficient.

Question No. 4:- In this question, the respondents were asked to answer whether the road has ever been maintained since it was completed by ticking a **"yes" or "unsure" or "no".** Similarly this question was to assess the sustainability mechanism of the roads. The results of the respondents are given in the table and the analysis is summarized in figure below.

Table 7; responses to question No.4

Road Section	Percentage response per questionnaire option		
	Yes	Unsure	No
Gayaza IC	57	17	26
Busega West end	44	16	40
Hoima IC	70	9	22
Sentema IC	54	13	33
Kyebando-Ntinda IC	46	13	41

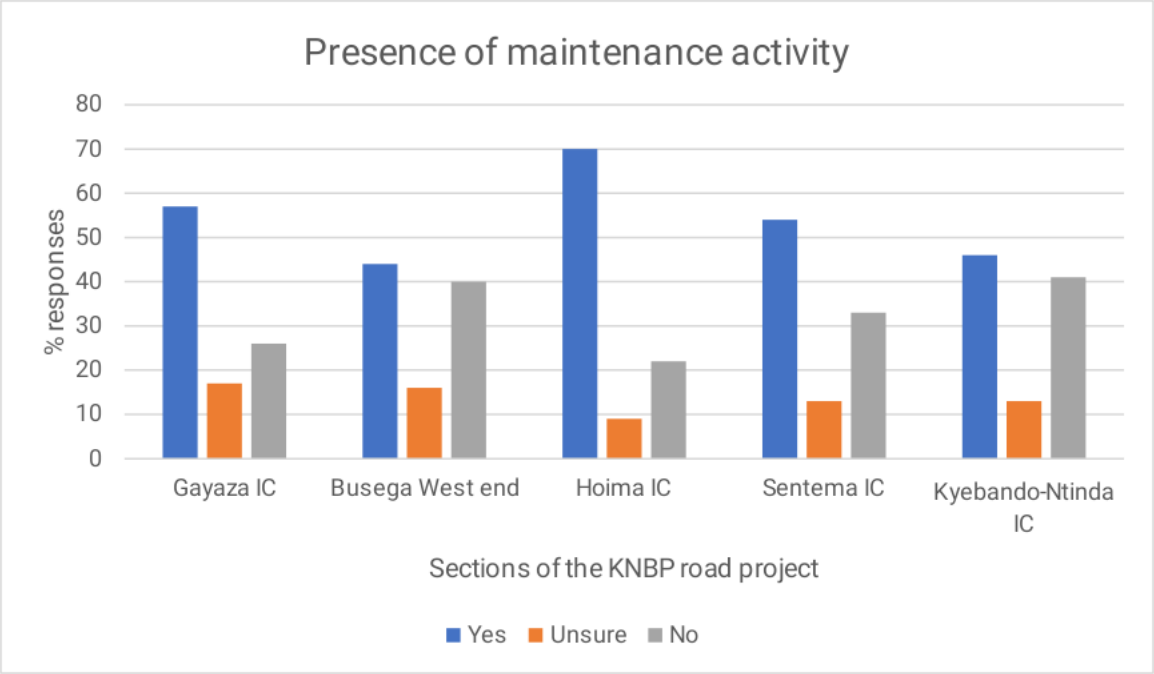


Figure 8; Maintenance activity presence.

The respondents who responded to the question with the answer of '**unsure**' implied

that they have not witnessed any maintenance activity taking place on the road. Therefore, a combination of the '**no**' and '**unsure**' answers confirms that Busega West end and Kyebando-Ntinda IC road sections have received minimal or no maintenance since they were completed. In general, the maintenance activities on the roads are inadequate hence there is no clear sustainability mechanism in place.

Question No.5:- The respondents were asked to assess the quality of work executed on the roads by answering whether it was '**very satisfactory' or 'satisfactory' or 'not satisfactory'**. This question was used as a measure of efficiency of the roads in terms of quality. The results of the respondents summarized in Table below and subsequently the analysis in figure below.

Table 8; Responses to question 5

Road Section	Percentage response per questionnaire option		
	Very satisfactory	satisfactory	Not satisfactory
Gayaza IC	24	52	24
Busega West end	21	63	16
Hoima IC	17	57	26
Sentema IC	24	63	13
Kyebando-Ntinda IC	19	65	16

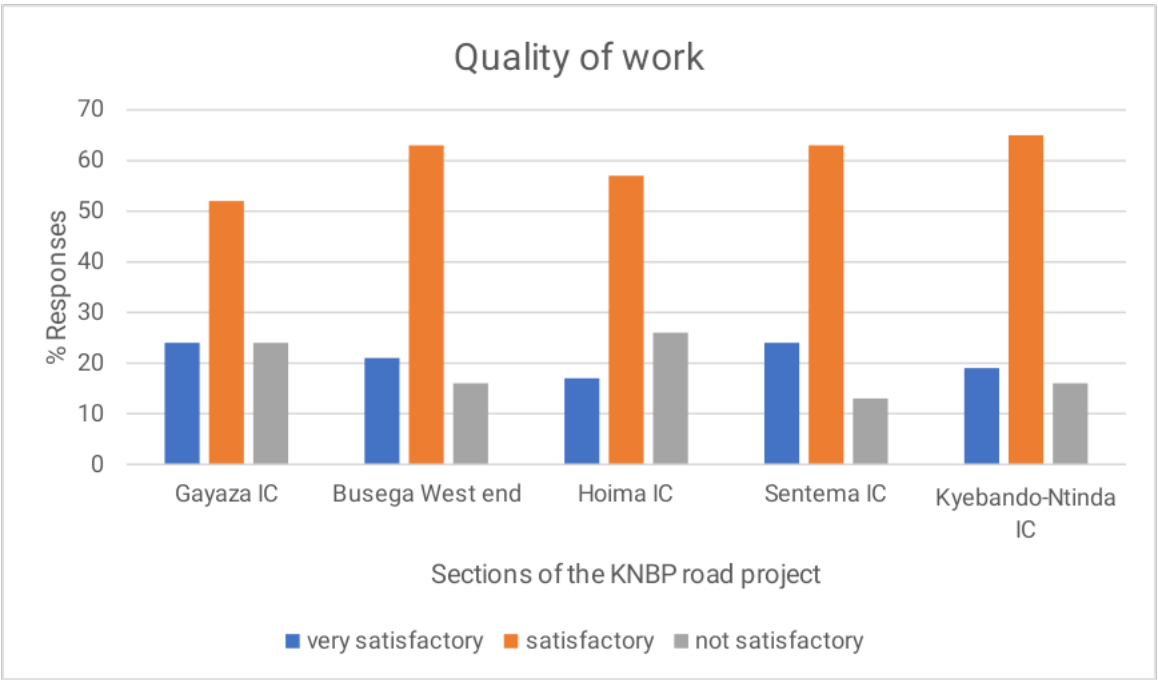


Figure 9: Quality of work executed.

Basing on the results above, all the roads were satisfactorily executed in terms of quality but not excellently done as the respondents expected. This could have been as a result of lack of participatory planning, consultation and knowledge of the expected quality. However, the combination of respondents who said that the quality of work was **'very satisfactory'** and **'satisfactory'** confirms that generally the roads were efficient in terms of quality.

Question No.6:- It was required of the respondent to answer whether the community access social services with ease as a result of the road facility by indication of a **"yes"** or "**unsure**" or "**no**". One of the objectives of the road projects was accessibility of social services by the community hence, this question was used to measure the effectiveness of the road. The results of the respondents are given in the table and analysis is summarized in the figure below.

Table 9; responses to question No.6

Road Section	Percentage response per questionnaire option		
	Yes	Unsure	No
Gayaza IC	90	5	5
Busega West end	88	5	7
Hoima IC	98	0	2
Sentema IC	91	7	2
Kyebando-Ntinda IC	87	8	5

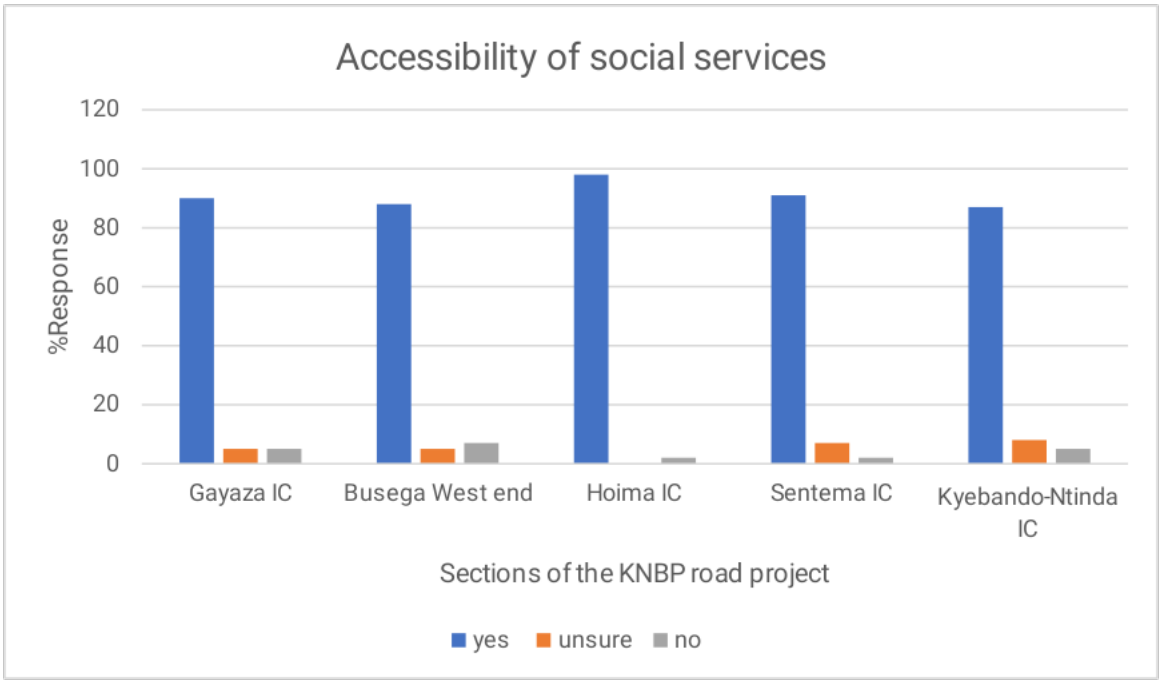


Figure 10: social services accessibility.

All the respondents agreed that there is improved accessibility of social services in all the five road sections. Over 85% of the respondents along each road section accept that the community access services with ease as a result of the project. This implies that

the road is over 85% effective in terms of service accessibility.

Question No.7;- The respondents were asked to answer as to whether the roads were accessible throughout the year with all type vehicles by a yes or unsure or no. This question was similarly used to establish the effectiveness of the roads. The results obtained are given in the table below and the analysis summary in the figure below.

Table 10: Responses to question no.7

Road Section	Percentage response per questionnaire option		
	Yes	Unsure	No
Gayaza IC	76	521	3
Busega West end	81	19	0
Hoima IC	9	24	67
Sentema IC	35	56	9
Kyebando-Ntinda IC	92	8	0

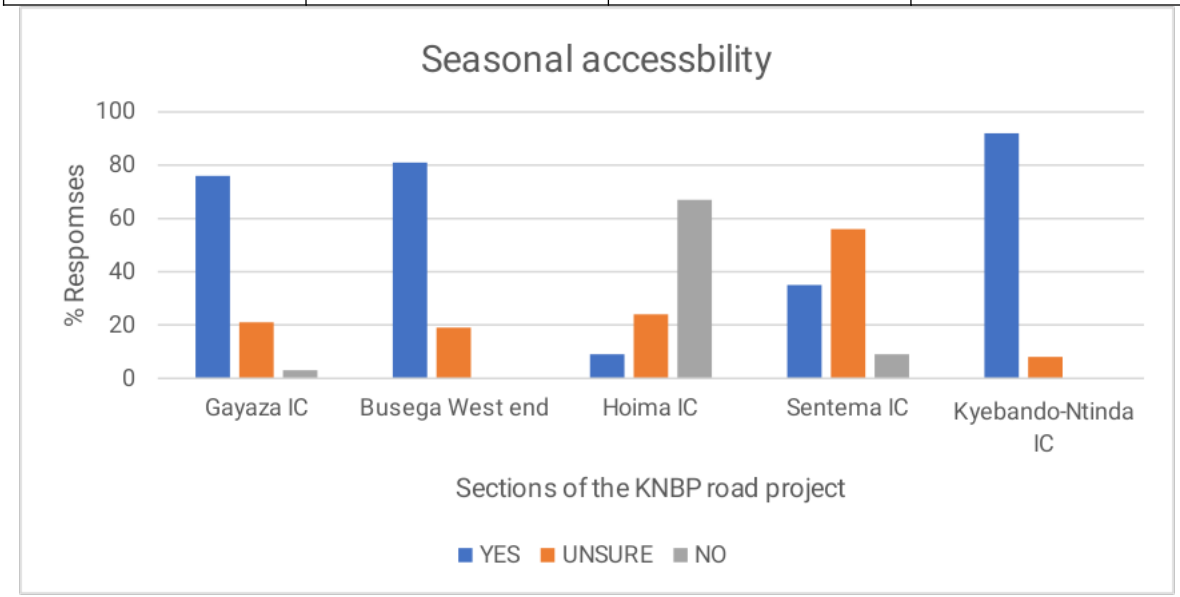


Figure 11;Seasonal accessibility of the road sections.

From the above analysis, it is evident that Gayaza IC, Busega West end and Kyebando-Ntinda IC sections are accessible all throughout the year. And with all types of vehicles. Hoima IC road section is not accessible all throughout the year and by all type of vehicles. The reasons which attribute to this are;

- Presence of sharp corners moreover at summits.
- The road is partially closed.

Most of the respondents of Sentema IC road section were unsure of the accessibility throughout the year and by all type of vehicles. This meant that although the road is accessible, the use of all types of vehicles throughout the year is uncertain because the road is characterized by;

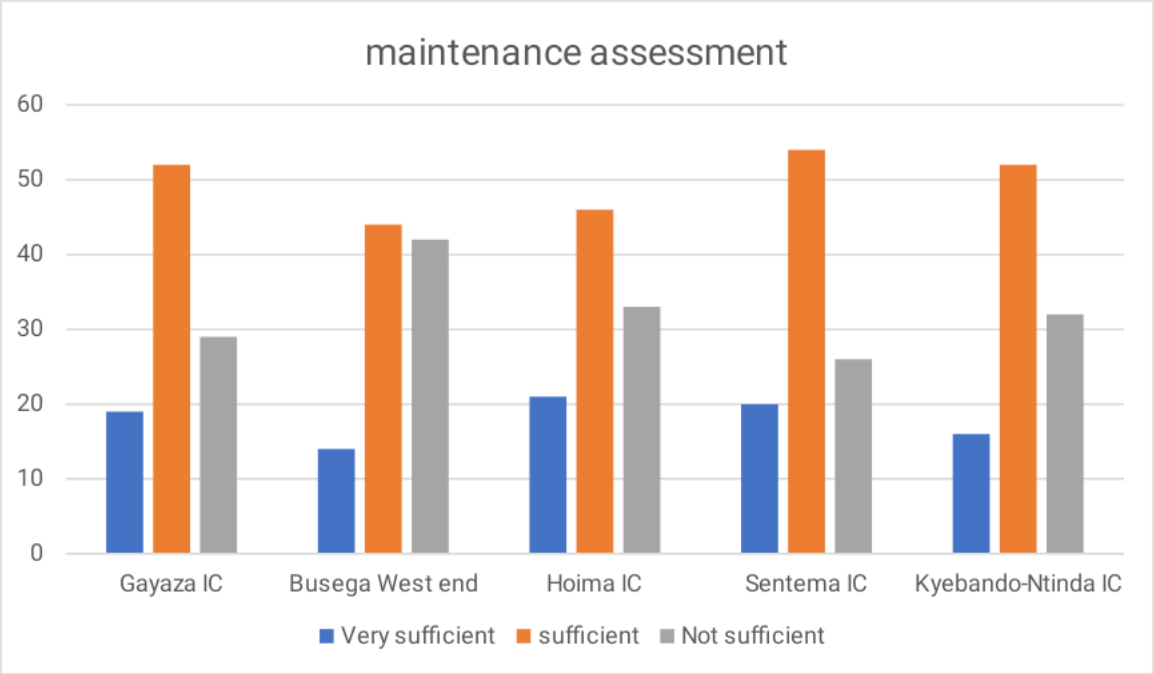
- Steep grades
- Sharp corners.

Basing on the above senarious, Sentema IC and Hoima IC road sections are not entirely effective.

Question No.8: The respondents were requested to asses the maintenance work on the road by giving their opinion whether it was very sufficient or sufficient or not sufficient. The question aimed at establishment of adequacy and existence of sustainability mechanism. The results obtained from the respondents are tabulated and analyzed as below.

Road Section	Percentage response per questionnaire option		
	Very sufficient	Sufficient	Not sufficient
Gayaza IC	19	52	29
Busega West end	14	44	42
Hoima IC	21	46	33

Sentema IC	20	54	26
Kyebando-Ntinda IC	16	52	32



From the figure above, it is evident that most respondents accepted that the maintenance work on the road is sufficient. A combination of respondents agreeing that the maintenance is sufficient and very sufficient, are more than those disagreeing. This implies that apart from Busega West end section 42% insufficient maintence, most of the road sections receive at least sufficient attention. The roads have some sustainability mechanisms; however, the standards of the sufficient maintenance need to be defined.

Question No.9; Increase in household income was one of the objectives of the road projects. The respondents were asked to give some indicators of increase in household income resulting from the implemented road project. The respondents confirmed the following indicators.

- Improvement of health and education services.
- Improvement of accessibility.

Question No. 10; The respondents were asked to specify the positive and negative impacts of the road projects after implementation. In their response, the following were the impacts of the road project.

a) **Positive impacts**
    - Poverty reduction
    - Socio-economic development
    - Increase household income
    - Accessibility to urban centres
    - Reduced time travel
    - Reduced vehicle maintenance costs

b) Negative impacts
    - Loss of land
    - Environment degradation
    - Pollution of environment
    - Accidents
    - Land fragmentation
    - Soil erosion

Question 11. This question asked the respondents to specify the measures of maintaining the positive impacts of the implemented road project.

- Increase in gazette road reserves.

- Involvement of the community in road maintenance.
- Increase budget for maintenance.
- Involvement of community participation in maintenance.
- Enhance monitoring and evaluation.

Question 12. The respondents were asked to specify the possible mitigation measures for the negative impacts of the project.

- Compensation and gazetting of more borrow areas.
- Provision of rubble strip/humps in trading centres and near schools.
- Gazetting road reserve areas.
- Budget provision, enhance field appraisal and planning.

Question 13; The respondents were asked to identify from the list the maintenance methods being adopted on the roads. In response, they identified the following methods.

- Routine maintenance.
- Periodic maintenance.

4.7 Summary of findings.

Following the analysis of the respondents from the five road sections, the findings were summarized as below.

Table 11: summary of findings.

Road Section	Criteria			
	Efficiency	effectiveness	Relevance	Sustainability
Gayaza IC	satisfactory	Yes	Very useful	sufficient
Busega West end	satisfactory	Yes	Useful	Sufficient

Hoima IC	unsatisfactory	No	Very useful	Insufficient
Sentema IC	unsatisfactory	No	Very useful	Insufficient
Kyebando-Ntinda IC	unsatisfactory	Yes	useful	Sufficient

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the problems encountered during the research period, lessons learned, conclusions and recommendations are discussed.

5.2 Problems faced during the research.

a) Language barrier became a problem while using the questionnaire interview.

b) Obtaining the target 50 respondents per road was not an easy task resulting in not getting a 100% response.

c) Travelling to all the roads from the beginning to the end was very expensive resulting in financial constraints.

d) Some respondents wanted to be paid before answering the questionnaire.

5.3 Lessons learned.

The lessons learned from the research of evaluation of costs on highway projects include;

a) Before a project is implemented it is vital to sensitize the community about its objectives, importance and what is expected in order for them to have a sense of belonging of the project.

b) Involve the community in planning, management, budgeting and maintenance of the project.

c) Thorough asset inventory and condition assessment is vital during planning stage and design of the project.

d) All tasks and standards of the work must have identified and defined before budgeting to minimize excessive variations.

5.4 Conclusions.

Five (05) sections roads on the KNBP were evaluated basing on five (05) criteria thus efficiency, effectiveness, relevance, impact and sustainability.

Gayaza IC

It was constructed at a cost and time frame less than the planned and the quality of work was satisfactory. Hence, the road was efficient in terms of cost and quality. It is accessible by all vehicles and at all seasons hence it is effective in terms of improved accessibility objective. Similarly, the road was within the priorities and needs of the community implying that it is relevant. Some sufficient maintenance has been exhibited on the road. This is a sign that some sustainability mechanism relatively exists. However, mitigation measures for negative impacts and measures to keep the positive impacts are not in place. Therefore, the road project was effective, relevant and relatively sustainable.

Busega West end

The road section was executed at a cost less than the planned, planned quantity and quality of work was satisfactory hence it was efficient in terms of cost, quality and quantity. The road is accessible in all seasons and is open to all vehicles, implying that the road is effective. The road was within the priority and needs of the stakeholders hence, it was relevant. Sufficient maintenance activities were observed implying that sustainability mechanism is relatively adequate. Mitigation measures for negative impacts and measures to maintain the positive impacts are not in place.

Hoima IC

The road section was executed at a cost and time frame exceeding the planned indicating that the project was inefficient in terms of cost and time frame although the quality was satisfactory. The road is partially accessible and vehicle selective due to grade and material used, hence the road is ineffective in terms of accessibility objective. In terms of needs and priority of the stakeholders it was very useful. Maintenance of the road was insufficient implying that sustainability mechanisms need to be enhanced. Mitigation measures to maintain the positive impacts are not in place.

Sentema IC

This road section was executed at a cost greater than the planned while the quality of work was less than that planned. However, the quality of work was sufficient hence the road was inefficient in terms of cost and quantity. The road is seasonally accessible and vehicle selective due to grade and material used, hence the road is ineffective in terms of accessibility objective. The road is within the needs and priority of the stakeholders implying that it is relevant. Maintenance of the road was insufficient implying that sustainability mechanisms need to be enhanced. Mitigation measures for negative impacts and measures to maintain the positive impacts are not in place.

Kyebando-Ntinda IC

The road section was constructed at a cost greater than the planned although the quality of work was sufficient hence the road was inefficient in terms of cost. It is accessible by all vehicles and all seasons hence it is effective in terms of improved

accessible objective. The road was within the priorities and needs of the community implying that it is relevant. Sufficient maintenance activities were observed implying that sustainability mechanism is relatively adequate. Mitigation measures for negative impacts and measures to maintain the positive impacts are not in.

Generally the five sections of the road evaluated, 40% of them were executed at the planned cost, quality and quantity. 60% were established to have attained the intended objective. All of the sections were within the priority and needs of the users and the maintenance mechanisms in place need to be enhanced on the entire road project.

Measures for keeping the positive impacts and mitigation measures of the negative impacts of the completed road sections are not in place.

5.5 Recommendations.

- To enhance efficiency in terms of cost, adequate field appraisal of the project before its' budgeted and implemented should be carried out.
- To minimize negative impacts like land fragmentation, community participation and sensitization during the planning of the project should be adopted.
- Maintenance of the roads sections should be given sufficient budget and priority in order to enhance sustainability of the roads and reduce early rehabilitation.
- To enhance, ease and encourage maintenance of the roads, the community should be involved in the planning, management and implementation of the projects in order for them to have a sense of belonging of the project. These solve some sustainability issues.

- To make the road sections effective in terms of accessibility, use of good material and design of road alignment should be taken up.
- To enhance efficiency further and minimize the excessive deviation between planned and actual in terms of time, quality and cost, tasks and standard of work should be identified and defined during planning and budgeting stages.
- Measures required to maintain the positive impacts of the road projects should be put in place.
- Measures to keep the positive impacts of the project should be put in place.
- Attention should be given to the mitigation measures for the negative impacts of the road project.

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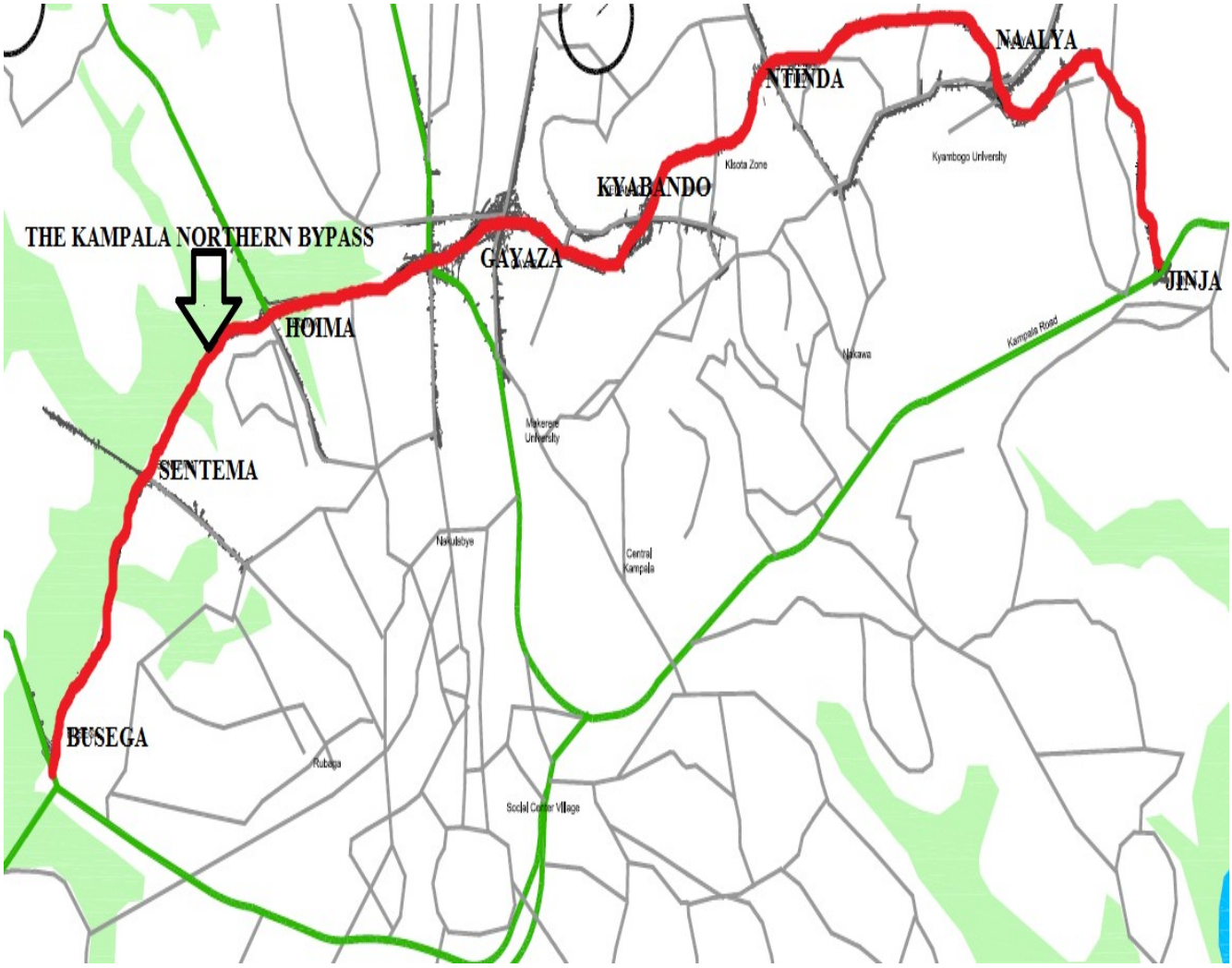
Appendix A: Kampala Northern Bypass Layout.



Appendix B: Questionnaire coding.

Road section	Question	Option	No. of responses	Percentage (%)
Gayaza IC	1	Most useful	26	57
		Useful	20	43
		Not useful	0	-
	2	Yes	44	96
		Unsure	1	2
		No	1	2
	3	Yes	18	39
		Unsure	22	48
		No	6	13
	4	Yes	25	54
		Unsure	6	13
		No	15	33
	5	Very satisfactory	11	24
		Satisfactory	29	63
		Not satisfactory	6	13
	6	Yes	42	91
		Unsure	3	7
		No	1	2
	7	Yes	16	35
		Unsure	26	56
		No	4	9
	8	Very sufficient	9	20
		Sufficient	25	54
		Not sufficient	12	26

Road section	Question	Option	No. of responses	Percentage (%)
Hoima IC	1	Most useful	28	61
		Useful	18	39
		Not useful	0	-
	2	Yes	45	98
		Unsure	1	2
		No	0	-
	3	Yes	16	35
		Unsure	22	48
		No	8	17
	4	Yes	32	70
		Unsure	4	9
		No	10	22
	5	Very satisfactory	8	17
		Satisfactory	26	57
		Not satisfactory	12	26
	6	Yes	45	98
		Unsure	0	-
		No	1	2
	7	Yes	4	9
		Unsure	11	24
		No	31	67
	8	Very sufficient	10	21
		Sufficient	21	46
		Not sufficient	15	33

Road section	Question	Option	No. of responses	Percentage (%)
Kyebndo-Ntinda IC	1	Most useful	17	46
		Useful	20	54
		Not useful	0	-
	2	Yes	34	92
		Unsure	2	5
		No	1	3
	3	Yes	19	51
		Unsure	11	30
		No	7	19
	4	Yes	17	46
		Unsure	5	13
		No	15	41
	5	Very satisfactory	7	19
		Satisfactory	24	65
		Not satisfactory	6	16
	6	Yes	32	87
		Unsure	3	8
		No	2	5
	7	Yes	34	92
		Unsure	3	8
		No	0	-
	8	Very sufficient	6	16
		Sufficient	19	52
		Not sufficient	12	32

Road section	Question	Option	No. of responses	Percentage (%)
Busega West end	1	Most useful	19	44
		Useful	24	56
		Not useful	0	-
	2	Yes	41	95
		Unsure	2	5
		No	0	-
	3	Yes	26	61
		Unsure	13	30
		No	4	9
	4	Yes	19	44
		Unsure	7	16
		No	17	40
	5	Very satisfactory	9	21
		Satisfactory	27	63
		Not satisfactory	7	16
	6	Yes	38	88
		Unsure	2	5
		No	3	7
	7	Yes	35	81
		Unsure	8	19
		No	0	-
	8	Very sufficient	6	14
		Sufficient	19	44
		Not sufficient	18	42

Road section	Question	Option	No. of responses	Percentage (%)
Sentema IC	1	Most useful	26	57
		Useful	20	43
		Not useful	0	-
	2	Yes	44	96
		Unsure	1	2
		No	1	2
	3	Yes	18	39
		Unsure	22	48
		No	6	13
	4	Yes	25	54
		Unsure	6	13
		No	15	33
	5	Very satisfactory	11	24
		Satisfactory	29	63
		Not satisfactory	6	13
	6	Yes	42	91
		Unsure	3	7
		No	1	2
	7	Yes	16	35
		Unsure	26	56
		No	4	9
	8	Very sufficient	9	20
		Sufficient	25	54
		Not sufficient	12	26

Appendix C: Questionnaire

RESEACH QUESTIONNAIRE FOR EVALUATION OF COSTS ON HIGHWAY PROJECTS.

THIS RESEARCH IS BEING DONE BY NAKATUDDE DOREEN REG.15/U/9500/PS, A THIRD YEAR STUDENT PURSUING A BACHELOR'S DEGREE IN CONSTRUCTION ECONOMICS AND MANAGEMENT. KINDLY REQUESTING FOR YOUR PARTICIPATION IN THIS RESEARCH STUDY BY COMPLETING THIS QUESTIONNAIRE AND THE INFORMATION PROVIDED WILL BE TREATED WITH AT MOST CONFIDENTIALITY.

CASE STUDY: KAMPALA NORTHERN BYPASS HIGHWAY

DATE:

.....

.....

PART A: PARTICULARS OF RESPONDENTS

1 PROJECT NAME:

.....

2 DISGNATION:

.....

3 Any other information: ……..

1. To what extent is the road mentioned above important for its existence?

	Response
Most useful	
Useful	
Not useful	

2. Was the project the most needed in the area?

	Response
Yes	
Unsure	
No	

3. Is there an existing budget for maintenance of the road project?

	Response
Yes	
Unsure	
No	

4. Has the road ever been maintained since the project started?

	Response
Yes	
Unsure	
No	

5. What kind of work is executed for the project in terms of quality? Is it very satisfactory, satisfactory or not satisfactory at all?

	Response
Very satisfactory	

Satisfactory	
Not satisfying	

6. Does the community access social services with ease as a result of the on- going or completed road project?

	Response
Yes	
Unsure	
No	

7. Is the road accessible throughout the year and by all type vehicles?

	Response
Yes	
Unsure	
No	

8. Assess the maintenance work conducted during the project? (give your opinion whether it was Very sufficient, sufficient or not sufficient.)

	Response
Very sufficient	
Sufficient	
Not sufficient	

9. One of the objectives of this road project was to increase household income. Which of the following are the possible indicators of income increase in household income to the users?

    - Increase in number of new structures.
    - Improvement in education and health services.
    - Increased number of people in market places.

    Others

    _____

    _____

10. Which of the following are impacts of this road?

    Positive impacts

    - Poverty reduction
    - Social-economic development
    - Income diversification
    - Improvement in service delivery
    - Reduced time travel
    - Reduced vehicle maintenance costs.

    Others

    _____

    _____

    Negative impacts

    - Loss of land
    - Compensation cost
    - Environment degradation

- Pollution of environment
- Excessive speed.
- Accidents

Others

_____

_____

11. Which of the following measures are in place to maintain the positive impacts.

- Gazette road reserves.
- Involvement of community in road maintenance.
- Availability of a budget for maintenance.
- Construction of health centres and school.

Others

_____

_____

12. Which of the following mitigation measures are in place for negative impacts?

- Planting grass in barrow areas.
- Compensation of barrow areas.
- Provision of rubble strip in trading centres.
- Gazatting of road reserve areas.
- Budget control.
- Prior feasibility study and planning.

Others

_____

_____

13. Which of the following maintenance measures is /are being adopted?

    - Routine maintenance
    - Periodic maintenance
    - Preventive maintenance
    - Corrective maintenance.

END