# ROAD INFRASTRUCTURE AND ECONOMIC GROWTH IN UGANDA 2000-2018

## KAMPALA INTERNATIONAL UNIVERSITY

## BY

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# DECLARATION

I Agaba Shield, hereby declare that this piece of work I have presented here is solely the result of my efforts apart from the work cited from other authors and that it has never been submitted to any University or Institution of Higher learning for the award of a degree.

**Student: Agaba Shield**

Signed ............................................

Date ......3rd /July /2019........

# CERTIFICATION

This certifies that the under-signed supervisor has read this report and the student can submit it to the Department Economics and Statistics for University marking.

Signed by................................................      Date ...08/07/2019...

**Mr.  Kawiso Martin Wilfred**

Supervisor

# DEDICATION

This work is dedicated to my beloved parents you always give me parental guidance, financial support and you always wish me the best in life May the Lord always answer your prayers.

# ACKNOWLEDGEMENT

# ABSTRACT

This report investigated Road Infrastructure and Economic Growth in Uganda 2000 - 2018, the Study considered all national roads, that is, paved and unpaved roads however, district roads were excluded due to lack of data for the entire period of the study. The emphasis on national roads was both due to data availability and the multiplier effects associated with these roads towards economic growth.

The objectives of the study were to: establish the causality between economic growth and expenditure on road infrastructure, examine the effect of expenditure on paved and unpaved roads on economic growth and the impact of coverage of paved and un paved road infrastructure on economic growth in Uganda.

Simple OLS single-factor regression models were employed in analyzing the effect of road infrastructure on economic growth. The models regressed investment in road infrastructure, coverage of both paved and un paved roads with the Gross domestic product (GDP)

The secondary data used was obtained from various sources including the statistical abstracts, Background to the budget from UNRA, UBOS, MFPED as well as World Bank data base.

The results indicated that in the long-run when government increases investment in roads by one unit, the rate of economic growth will increase by 0.013222 percent, if government increases in coverage of paved roads by one unit, the rate of economic growth will grow by 0.003 and if government increases the coverage of un paved roads by one unit, the rate of economic growth will be 0.0008.

Basing on the findings of the study government should commit more resources to increase provision of roads especially paved since they are relatively durable as well as making efforts for the unpaved roads to reach all parts including the rural areas to further stimulate economic growth through the multiplier effect. Also, both public and private sectors should increase on the directly productive capital in order to enhance sustainable economic growth in the country

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# ACRONYMS

| | |
|---|---|
| ADF | Augmented Dickey-Fuller |
| ECM | Error Correction Mechanism |
| EU | European Union |
| GDP | Gross Domestic Product |
| MFPED | Ministry of Finance Planning and Economic Development |
| MWOT | Ministry of Works and Transport |
| ODA | Official Development Agency |
| OECD | Organization of Economic Cooperation and Development |
| PPP | Public-Private-Partnership |
| MLG | Ministry of Local Government |
| MTEF | Medium Term Budget Expenditure Framework |
| PEAP | Poverty Eradication Action Plan |
| RAFU | Road Agency Formation Unit |
| NRM | National Resistance Movement |

# CHAPTER ONE

## INTRODUCTION

The chapter covers the back ground of the study, statement of the problem, purpose of the study, specific objectives, research hypothesis, and scope of the study and significance of the study.

### 1.1.0 Historical Back Ground

Uganda, the "Pearl of Africa" is a country of constraints, her economy has expanded at an average rate of 6.3% per annum since 1986 but its poverty rates remain significantly high and unimpressive in reflecting this growth rates (Douglas and Richard, 2010). It had experienced 15 years of devastating political instability, social and economic collapse that reversed the optimistic situation inherited at the time of independence in 1962. At that time Uganda, had a stable and growing economy and a promising physical and human capital development, superior to that of its neighboring countries. This optimism gave way to economic destruction, international isolation and emergence of uncompetitive subsistence production system with limited participation in both domestic and international markets coupled with civil struggles in most parts of the country which created insecurity. In 1986, the National Resistance Movement (NRM) after a five year protracted civil war, captured power and initiated a reign of relative political stability, economic reforms that laid a foundation for sustained economic growth and expansion seen to date. Over the period the current government has strived to improve on the infrastructure in the country with emphasis on the energy and transport sectors as a way of stimulating economic growth.

The transport sub-sector contributes immensely to the economic growth and poverty eradication in the country through various ways. An efficient transport infrastructure is vital in supporting economic growth and improvement of the quality of life (Owen, 1987; Queiros and Gautam, 1992). This can be looked at in line with improvement in mobility especially the case of access to the rural areas where the majority of the population derives its livelihood from and also stimulating production through linking of markets to production centers. It is worth noting that in the colonial era, colonialists were interested in constructing roads to areas where they could get raw materials not to open the country to economic development (John Byabagambi. works state

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minister). Per now, provision of a road facility is on the basis of any of these two reasons; that is construction following the rate of return a particular road is likely to have or following government promise of awarding a particular community for being loyal to the regime. The former reason justifies an efficient transport system that will provide the multiplier effect of road infrastructure consequently leading to increased effect of the road variable to the economic growth of the nation. According to Nyende et al. (2010), since 2007/08, the National Resistance Movement (NRM) Government has accorded significant importance to the provision of a sound and well-coordinated transportation system.

The road sector has been identified as one of the six critical sectors that require substantial budget expenditure if the objective of the GOU's National Development Plan is to be achieved. The sector contributes to increasing rural incomes and supports the private sector and in the past years, on average the NRM government has been spending 1.6 trillion on roads a year. Per now the works and transport sector is allocated 20.8% of the GOUs National budget particularly the roads taking 4786 billion in FY2018/2019. The Government contribution accounted for over 50% percent and by the end of the financial year 2018/2019, a total of 6027 kilo meters of tarmacked roads are projected to be accomplished.

During the colonial era, Uganda had approximately just 844kms of tarmac roads, by the time President Milton Obote was toppled by Idi Amin in 1971, Uganda had about 1200 km of tarmac roads , after the coming of NRM, alongside ensuring security, emphasis was also put on infrastructure development including roads and the total road network in 2007 was estimated to be 68,800km and was classified in different ways; that was the national road network of 10,800km of which 3,000km was paved and 7,800km gravel surfaced, the district road network of 25,000km (mainly unpaved), Urban road network of approximately 3,000km (mostly paved). between 2010/11- 2014/15, the stock of paved road network increased by 19.7% from 4,364 to 5,224 Km, National paved roads increased by 21.7 % in the last 5 financial years (from 3264.1 to 3981 Km), 80% of the paved national road network was rated to be in fair to good during FY 2014/15, Uganda's total road network in is currently estimated to be 129,469 Km long, of this, the community access roads constitute 50%, District roads 26%, urban roads 7% and national roads.

## 1.1.2 Theoretical Perspective

It is therefore, imperative that the Uganda Government provides these public facilities to stimulate development of other sectors, which addresses needs of the poor and the vulnerable groups' consequently economic growth (Matovu, 2000).

Identifying the determinants of long-run economic growth remains central to the Uganda's economic policy debate. A number of studies have investigated the changing structure of economic growth in Uganda since the early 1980s (Sennoga and Matovu, 2010; Fan et al, 2007; Musisi, 2007). . According to the study conducted by Mitchell (2002) increase in government expenditure urges the government programmes provide valuable public goods such as infrastructure. According to (World Bank, 1992), inadequate infrastructure Constrains productivity at all levels, as such infrastructure reduces the productivity of firms and households and this affects the aggregate productivity of the economy. According to Matovu, (2000), it is important to note that, when government prioritizes road infrastructure spending, the growth effects have been shown to be substantial due to the increased household productivity which results from the positive externality effects associated with good infrastructure, for example, linking up of markets as well as employment, Devarajan, Swaroop and Zou (1996) drew analytical conclusions that road infrastructure negatively affected economic growth and attributed this to the tendency of developing countries over supplying roads. . According to (World Bank, 1992), inadequate infrastructure Constrains productivity at all levels, as such infrastructure reduces the productivity of firms and households and this affects the aggregate productivity of the economy.

## 1.1.3 Conceptual Perspective

In this study the independent variable was conceptualized as road infrastructure and the dependent variable as economic growth. Government has a cardinal responsibility of providing public services where private sector is not able to invest in order to sustain economic growth linkages especially those related to National Development Plan (NDP). This is because the undertakings in this sector require a huge capital outlay with long term benefits and are not normally attractive to the private sector. With the use of tax payer's money, concessional loans and grants from China, US, Japan, Western Europe and international organizations, Uganda has

prioritized the building of economic infrastructures mainly roads and power stations. This is in an attempt to give the country an advantage of overcoming the high prices that reflect an increase in cost of production resulting from poor infrastructure especially roads. Good infrastructure helps to raise productivity and lowers costs in the directly productive activities of the economy, but it has to be expanded fast enough to meet the demand for infrastructure in the early stage of development. Construction expense for infrastructure such as transportation sector is enormous and construction period is also long. Prediction of demand pattern and investment allocation, which are the key factors of infrastructure development planning, must be based on a long term economic Development trend and land use planning, which predicts the country's temporal and spatial demographics and economic structure. Dormant as they may seem, road infrastructure propels the economy to the growth path through its multiplier effect for example reduced cost of production and easy factor mobility. This study therefore will attempt to find out if road infrastructure has got anything to do with economic growth in Uganda.

## 1.1.4 Contextual Perspective

Uganda is located in East Africa covering the area of 241,038 sq km, 127districts and Kampala as the capital city and the administrative unit. MOWT statutorily has the overall responsibility for the development, management and maintenance of the national road network, as per UNRA Act of 2006. UNRA is an autonomous body responsible for overall planning, construction, maintenance and management of the country's national roads UNRA is headed by an Executive Director. The community access roads, district roads, urban roads are under district and urban authorities like KCCA in Kampala.

## 1.2.0 Problem Statement

Road infrastructure remains the main mode of transport within Uganda and as a main gateway to neighboring countries. Therefore the quantity and quality of roads impacts greatly on economic activities in the country. Poor road infrastructure has a negative effect on the production of goods and services leading to increased prices which limits the competitiveness of the country's exports and consequently the returns from international trade. If government is to be helpful in bringing about a faster growth rate, it has to do this by discouraging the misallocation of resources Tanzi (1994).

According to Betty Amamukirori 2016, shs 9 trillion used by UNRA to construct 1500km of roads in 7 years were enough to construct at least 5147 kms. This implies that there is in efficiency which results into low output compared to the input. Therefore the growth in kilometers of roads for both paved and unpaved has been low over the years compared to the finances invested in. This slow growth affects economic growth of the country but there is limited empirical evidence on the linkage between road infrastructure and economic growth in Uganda. The study hence sought to establish the link between national income and road infrastructure.

## 1.3.1 Purpose of the Study

The purpose of the study was to examine the effect of road infrastructure on the economic growth of Uganda for the period: 2000-2018.

## 1.4.1 Specific Objective

i.      To investigate the effects of investment in roads on economic growth in Uganda.

ii.     To investigate the relationship between coverage of paved roads and economic

        Growth in Uganda.

iii.    To determine the impact of coverage of un paved roads on economic growth in Uganda

## 1.4.1 Hypotheses

1.  Investment in roads infrastructure does not cause economic growth
2.  An increase in the coverage of paved road infrastructure doesn't lead to an increase in economic growth.
3.  An increase in the coverage of unpaved road infrastructure doesn't lead to an increase in economic growth.

## 1.5.1 Scope of the Study.

The study sought to establish the effect of road infrastructure on economic growth of Uganda and considered all national roads, that is, paved and unpaved roads. However, district roads are excluded due to lack of data for the entire period of the study. The emphasis on national roads is both due to data availability and the multiplier effects associated with these roads towards economic growth. As such, the study sought to find out the effect of road infrastructure provision in terms of coverage of paved and unpaved roads onto the country's economic growth from 2000 to 2018 and also whether the road infrastructure coverage is at its ideal level to bring about the desired growth.

## 1.6.1 Significance of the Study.

The purpose of this research was to highlight what is understood (and what is not understood) about the linkage between road infrastructure and economic growth and the implications about this for the management of road infrastructure in Uganda. The importance of road infrastructure towards economic growth is observed through directly availing employment opportunities to people carrying out the activity of construction and maintenance. Also, improved road infrastructure greatly improves accessibility as well as linking up of markets. This is motivated in a way that factors of production are easily moved from one location to another and a cross borders consequently improving the country's competitiveness. Considering Uganda being an agricultural economy with most of the cultivation being carried out in the rural areas, improvement of the road sector will greatly enhance production by way of cheap linkage of markets to the farm lands brought about by reduced transaction costs. The research findings will hence help policy makers determine how much government needs to spend on the road sector to bring about the desired sustainable economic growth rates and also help to decide on which road category to lay much emphasis.

## 1.7.1 Organization of the Study.

The study is organized in five chapters that is Chapter one which presents the background of the country in relation to its economic performance as well as the boundary within which the variables are analyzed. Chapter two shows the various write ups and publications in line with the

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contribution of road infrastructure to economic growth. The third chapter presents the various methods that were used in the analysis of the data and testing of the hypothesis. Chapter four presents the findings that were obtained in the analysis and consequently used for recommendation in chapter five.

# CHAPTER TWO

## LITERATURE REVIEW.

### 2.1.0 Introduction

This chapter presents the definitions of the key terms used in the study and the various empirical studies done on infrastructure and economic growth.

### 2.2.0 Conceptual Definitions

Conceptual definition means the process of establishing what a concept means in the context of a particular study (Singleton, 1999). Cozby (2007) gives the meaning of the term as defining a concept in terms of operations or techniques the researcher uses to measure or manipulate it. He further argues that conceptual definition forces researcher(s) to discuss abstract concepts in concrete terms. Conceptual definition helps to avoid misconception to the users of a particular study. Based on the above elucidation, the key concepts that have been presented in this study include road infrastructure and economic growth.

### 2.2.1 Infrastructure

Infrastructure is referred to as social overhead capital by many development economists. Hirshman, (1958) provided appropriate definition of infrastructure for the discussion, as social overhead capital encompassing activities that share technical features such as economies of scale and economic features like spillovers from users to non-users. The social capital acts as a principal to expand private sector investment, and in contrast, social capital becomes relatively lacking along with the expansion of private capital and productive activities.

Social overhead capital contributes to enhancing productivity and assists in the realization of the potential ability of human capital, and creates situations in which that potential can fully function. It also contributes directly and indirectly to improving the safety and quality of people's lives. Within the scope of infrastructure, electric power, ports, roads, and telecommunications are often used as the services and intermediate goods that are essential for the productive processes of private sector Hirshman, (1958).

Infrastructure has been defined in terms of the physical facilities (roads, airports, utility supply systems, communication systems, water and waste disposal systems etc.), and the services

(Water, sanitation, transport, energy) flowing from those facilities according to Sida (1996). Fox (1994) defines public infrastructure as 'those services derived from the set of public works traditionally supported by the public sector to enhance private sector production and to allow for household consumption'. He further states that the importance of infrastructure as an instrument of economic development and potentially, poverty reduction, is reflected in the high level of investment which national governments and international donor agencies put into infrastructure development.

## 2.2.2 Economic Growth

Economic growth corresponds to the increase of the country's potential GDP caused by the increase on advanced technology, capital stock and improvement in the quality and level of literacy. Economic growth is essential to every country and particularly to developing countries in order to get out of predicament of prehistoric poverty. This is the increase of country capital stock, the technological advances and the improvement in the quality and level of illiteracy in the country. The value of goods and services produced in the country can be also determining the country economic growth. The economic growth will be measured by comparing the gross national product (the standard measure of the output of an economy) in a year with the gross national product of the previous year. The economic growth of the country can be positive or negative while negative growth indicates the depression of the economy and recession.

GDP per capital (GDP) is the estimation of the value of goods produced per person in the country, equal to the GDP of the country divided by the total number of the people in the country. This can be seen as a roughly display of a nation's prosperity. The picture of a country productivity and its international competitiveness can be observed on the GDP per employed person is the average labour productivity. The real GDP growth rate will be determined by the percentage change in real GDP from year to the next. The term economic growth primarily concerned with the long run economy measured by the GDP of the country taken as the increase of standard of living of the people. The economic growth of the country should focus on the growth rate of GDP per capital, thus the output per person rather than to consider the overall

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output. The output of the economy as explained by the Solow (1997) mathematically can be illustrated on the production functions on association of various inputs and the level of output. The flow of output mostly depends upon the different types of capital that makes production possible. The simple form of an economy-wide production function assumed by Solow is written is the form:

$Q = A \, K^a \, L^b$ Where A indicating as multifactor productivity, a is less than one and also b are the diminishing return to a single factor but a+b =1 showing constant return to scale. While Q is the aggregate output, and any increase on Q should come from one of three sources. The increase in L due to diminishing return to scale will cause the reduction of Q/L thus output per worker while the increase of stock capital will also increase both output and Q/L and the increase in A increase output per worker Q/L. The model tries to highlight that in order to raise income per capital achieving economic growth there is a need to increase the amount of capital that each person works and to increase technology.

## 2.3.0 Conceptual Frame work

**INDIPENDENT VARIABLE**                    **DEPENDENT VARIABLE**

| ROAD INFRASTRUCTURE |
| --- |
| • Investment in road infrastructure |
| • Coverage of road infrastructure |

| ECONOMIC GRAWTH |
| --- |
| • GDP |
| • Level of employment |
| • Standards of living |

**INTERMEDIATE VARIABLE**

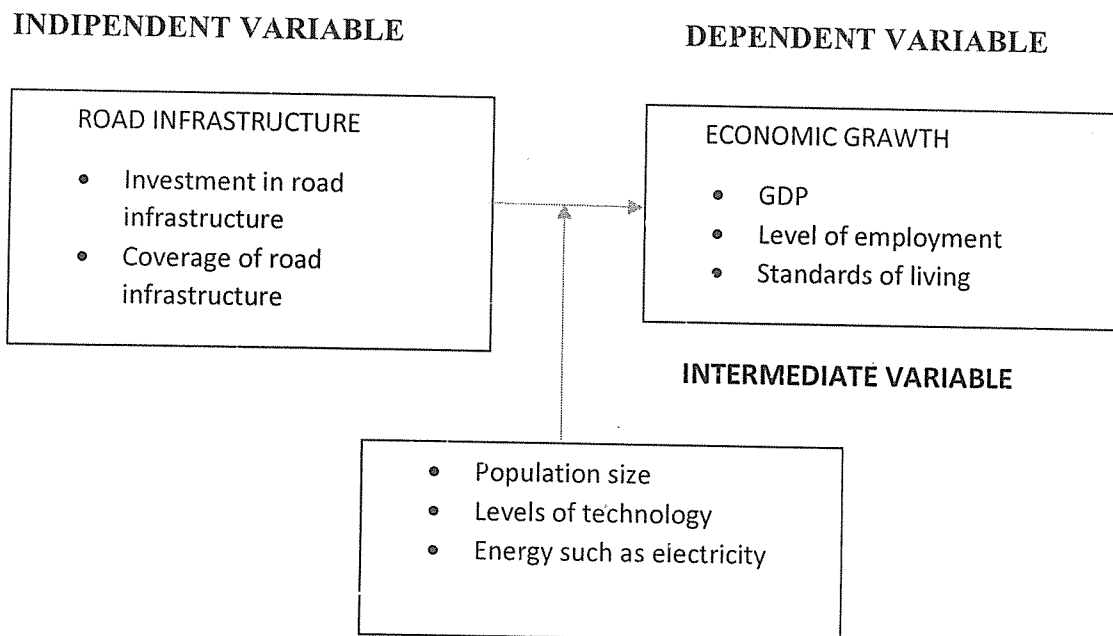| |
| --- |
| • Population size |
| • Levels of technology |
| • Energy such as electricity |

Figure 2.3.0 Conceptual Frame Work

## 2.4.0 Theoretical Literature Review

### 2.4.1 The Solow – Swan Model

The Solow and Swan (1996) introduced the Solow's model in 1996. Their model is also known as Solow-Swan model or simply Solow's model. In Solow's model, other things being equal, saving/investment and population growth rates are important determinants of economic growth. Higher saving/investment rates lead to accumulation of more capital per worker and hence more output per worker. On the other hand, high population growth has a negative effect on economic growth simply because a higher fraction of saving in economies with high population growth has to go to keep the capital-labour ratio constant. In the absence of technological change and innovation, an increase in capital per worker would not be matched by a proportional increase in output per worker because of diminishing returns. Hence capital deepening would lower the rate of return on capital.

### 2.4.2 The Endogenous Growth Theory

In the late 1980s and early 1990s (Paul) Roamer came up with a new growth theory, the Endogenous growth theory, explaining the need of new concept of human capital, the skill and knowledge that increase productivity. Endogenous growth theory argued that the size of savings is an important factor in shaping the long run growth rate of an economy. The theory emphasizes that there are constant returns to capital and economies never reach a steady situation as accumulation of capital growth does not slow but the rate of growth mostly depends upon the type of capital the country invests in. Economic growth theory put emphasis on the importance of capital accumulation in the realization of economic growth, the stock of capital can increase the economic output in the long run, and government can increase the productive capacity of an economy by investing on physical investment like infrastructure.

A German economist, Wagner (1993). Identified a growing share of government in the economies of industrializing European countries. He used some empirical evidence from a number of Western industrializing countries to formulate what is today generally known as "the Wagner's law". According to Wagner, rising government expenditure was an inevitable feature of the developing countries of his time also known as industrial countries, the law simply states

that "public expenditure will increase if the per capita income of industrial countries increases". The implication of this law is, therefore, that government expenditure will increase faster than output of the economy.

## 2.4.3 Modern Conception of Economic Growth Theories

Adam Smith and David Hume (1996) came with the modern conception of economic growth theory by starting with the critique of mercantilism and introducing the concept of "the wealth of nations" emphasizing on the importance of agriculture and manufacturing as the key sector to economy. Explaining the endogenous economic growth Adam Smith developed a simple production function Y = (L,K,T) where Y is output, L is labor, K is capital and T land; thus indicating output is related to capital, land and labor input. Smith explored the importance of division of labour and improvement of machinery and international trade as they improved on growth. He believed on savings because of its importance of creating investment and income distribution as the determinants of national growth. Adam Smith and Malthus on classical model described economic growth on provision on fixed land and growing population. In the non-existence of technological change, increasing population eventually weakened the supply of free land. The consequence of increase in population density generates law of diminishing returns. Malthusian equilibrium comes up when the wages of labour had gone down to subsistence level, under which the supply of labour will not produce itself. On criticizing the Classical model, however, Samuelson and Nordhaus (1999) argued that it did not consider the reality that technological change kept economic development moving ahead in industrial countries by repeatedly shifting the productive curve of labour forward.

## 2.5.0 Empirical Studies on Infrastructure Development and Economic Growth

Uganda is a land locked country with road infrastructure constituting the main mode of transport, however insufficient allocation have been directed to the road sub sector. Poor road conditions and transportation system hinder movement of goods and people in the urban areas. Lack of adequate infrastructure could also be a disincentive to both local and foreign investors in our country. According to (World Bank, 1992), inadequate infrastructure Constrains productivity at all levels, as such infrastructure reduces the productivity of firms and households and this affects the aggregate productivity of the economy. Transportation plays a major role in economic

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development both urban and national. It also has a broader role in shaping development and the environment. The interface between transportation investment and economic development has broad ramification that goes beyond the basic purpose of moving goods and people. Transportation facilities located in a specific place provide services to businesses (and households) within a specific geographic area, and their use is directly related to moving goods and people between two points. It is also essential in the operation of a market economy. According to Matovu, (2000), it is important to note that, when government prioritizes road infrastructure spending, the growth effects have been shown to be substantial due to the increased household productivity which results from the positive externality effects associated with good infrastructure, for example, linking up of markets as well as employment. Williamson and Canagarajah, (2003) and World Bank, (2002) also argue that roads, agriculture, water and sanitation may yield higher returns for employment and income creation in Uganda than primary health care, education and that the poverty action fund, through the promotion of a narrow interpretation of pro-poor programmes has led to the skewing of budget allocations away from programmes that may have resulted in greater poverty reduction.

Studies have demonstrated a positive link between improvements in the road infrastructure and economic growth. Nworji and Oluwaiye (2012), showed that expenditure on roads, power or communication reduces production costs, stimulate private sector investment and profit margin of firms, create increased employment and wealth; thereby improving the growth in the economy. Consequently inadequate transportation limits a nation's ability to utilize its natural resources, distribute food and other finished goods, and integrate the manufacturing and agricultural sectors, and supply education and medical services. However, there is little empirical evidence linking transportation improvements to economic growth more especially in developing countries as opposed to developed countries where the link has been established

(Aschauer, 1989 b, c), (Gramlich, 1994; Sanchez., 1998; Canning et al, 1994; Easterly and Rebelo, 1993). In developing countries it is not generally known whether an investment in transportation infrastructure is more productive than investments in other sectors of the economy nor is it known whether capital expenditures on one mode of transportation is more productive than those spent on a Byoungki, (2006) argues that road infrastructure development is one of the most integral parts of public policies in developing countries. Supporting infrastructure

development in developing countries by advanced countries is extremely an important field towards enhancing economic growth consequently development. This can be inferred from the fact that many international organizations such as World Bank and OECD are actively promoting the improvement of infrastructure by providing various support programs to developing countries. However, the precise relationship between infrastructure and economic growth is still frequently debated upon.

World Bank, (1994) reported that there was a close relationship between road infrastructure and economic growth in Asia and in many case studies, such as those on the direct and indirect economic impact of infrastructure in farming sector in India. In the case of China, the coverage of intercity transport networks is one of the thinnest in the world. China's transportation investments amounted to only 1.3 percent of GNP annually during 1981-90, a period of rapid growth in transportation demand. Since the onset of China's open door policy in 1979, economic growth averaging 9 percent a year has resulted in an unprecedented expansion in intercity traffic with growth averaging 8 percent a year for freight and 12 percent a year for passengers.

Devarajan, Swaroop and Zou (1996) drew analytical conclusions that road infrastructure negatively affected economic growth and attributed this to the tendency of developing countries over supplying roads. This study is an improvement on the other studies on economic growth government expenditure relationship in Uganda for a couple of reasons which include; consideration of government expenditure on road infrastructure reflected by coverage in kilometers to be a very important variable that affects economic growth. Secondly, this study employs a methodology that captures causality as well as cointegration that many studies have not incorporated consequently. in conclusion, it's important to note that the various studies reviewed, used different methodologies and consequently came up with relatively divergent results, for example, Laudau, (1983) and Komain and Brahmasrene, (2007.

# CHAPTER THREE

## RESEARCH METHODOLOGY

This part of the study describes the research design, methods, and techniques that have been used in the data collection, the various sources of data, and types of data collected the methods of collections as well as the techniques that have been used to analyze the data.

## 3.1.0 Research Design

Research design is an activity plan based on the research objective and it guides the selection of source and types of information. Koda (2006) defines research design as arrangement of conditions for collecting and analyzing data in a manner that it aims to combine relevance of the research purpose with economy in procedures. Corlien, (2003) adjoins that research design is not related to any particular method of collecting data or any particular type of data. Any research design can, in principle, use any type of data collection method and can use either quantitative or qualitative data.

According to Wiley (2005). Qualitative research involves studies that do not attempt to quantify their results through statistical summary or analysis, qualitative studies typically involve interviews and observations without formal measurement, qualitative research is often used as a source of hypotheses for later testing in quantitative research and quantitative research involves studies that make use of statistical analyses to obtain their findings. Key features of quantitative research include formal and systematic measurement and the use of statistics data. The study used a case study design to analyze the effects and relationships between road infrastructure and economic growth in Uganda. Due to the objectives of this research, a methodology of quantitative approach has been applied. The quantitative approach in this research is mainly for answering the first and second hypothesis. From the research aims it can be seen that the focus is on reviewing the impact of increase of paved and unpaved roads on Economic growth, therefore this quantitative part of the research actually served as analytical work for making the whole dissertation a little more comprehensive.

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## Population of the Study

According to Bryman (2003). Population basically is the universe of units from which the sample is to be selected. The term 'units' is employed because it is not necessarily people who are being sampled, the researcher may want to sample from a universe of nations, cities, regions, firms, etc. Thus, population has much broader meaning than the everyday use of the term, whereby it tends to be associated with a nation's entire population. The targeted population for this study were the data of all road infrastructure and economic growth of Uganda from 2007 - 2017.

## 3.2.0 Methods of Data Collection

This study based on secondary time series data of road infrastructure and Gross Domestic Product (GDP) in order to explain any relationship that may exist between levels of road infrastructure and levels of economic growth as measured by levels of Gross Domestic Product (GDP). the annual data on the above variables were used from 2000 – 2018. The data on the impact of road infrastructure on Economic growth a case study of Uganda are collected through documentary review. The annual secondary data regarding the research topic and selected sectors was collected so as to reach the objective intended to be attained in this research.

These data obtained from the Office of the principal Economist Ministry of Finance of Uganda and UBOS library.

## 3.3.0 Reliability and Validity of Data

## 3.3.1 Reliability of Data

Reliability refers to the consistency with which repeated measures produce the same result across time and across observers. Reliability denotes to how consistent a research producer or instrument. So, Reliability implies stability or dependability of an instrument or procedure in order to obtain information (Bryman, 2001). A proper study will have to regards reliability, consistency, stability and predictability (synonyms for reliability). Whether the result is replicable. Therefore the stability and equivalence aspect of reliability of this research study has been achieved carefully by replicating the research methods. The main problem encountered

during data collection was inconsistency of the data. Mikesell and Zinser's (1993) observed that it is very difficult to obtain accurate data on economic variables in any developing country. These problems come mainly from weak institutional framework in monitoring the economy associated with poor reporting and recording.

## 3.3.2 Validity of Data

Validity refers to the extent to which concept one wishes to measure is actually measured by particular scale or index. That is, the extent to which an account accurately represents the social phenomena to which it refers (Kombo, 2006).Also according to Graziano & Raulin, (2004) Validityis an important term in research that refers to the conceptual and scientific soundness of a research study. The primary purpose of all forms of research is to produce valid conclusions. Validity is, therefore, a very important and useful concept in all forms of research methodology. Its primary purpose is to increase the accuracy and usefulness of findings by eliminating or controlling as many difficult variables as possible, which allows for greater confidence in the findings of a given study. In order to achieve it, the nonprobability research process should be adopted from designing the research problem and undertaking the research process.

## 3.4.1 Data Analysis

The study carried out to evaluate the significance of the levels of various road infrastructure programs on the level of economic growth achieved at any time. This has been achieved by testing the following appointed hypotheses:
  i.    investment in the road infrastructure is positively related to economic growth
  ii.   coverage of road infrastructure is positively related to economic growth
In this section, the results of regression analysis were presented. The approach examined the impact of road infrastructure on economic growth by expressing it as a function of government expenditure. The aim of this approach was to examine the effect of the independent variables on economic growth.

The following are the relationships that were presented in this approach:-

GDPP =     f (IRI,   CPR,   CUR)

.................................................................$i$

Where:-

GDP   =   Real Growth Domestic Product

IRI    =      Investment in road infrastructure

CPR   =    Coverage of paved roads

CUPR  =    Coverage of Un paved roads

In mathematical form this functional relationship becomes:-

GDP =     $\beta_0$   +   $\beta_1 IRI_t$   +   $\beta_2 CPR_t$ +   $\beta_3 CUPR_t$   +        $\varepsilon$

.................................................................$ii$

Where: $\beta_0, \beta_1, \beta_2, \beta_3$ are the regression coefficients to be estimated, $\mu$ is the error term, t is a time series (annual) and other variables are as defined earlier.

# CHAPTER FOUR

## PRESENTATION AND DISCUSSION OF FINDINGS

### 4.1.0 Introduction

As noted earlier, the main purpose of this study is to determine the impact of road infrastructure on economic growth of Uganda. This chapter presents the analysis and discussion of the study findings. The chapter is divided into three main sections; the first section reminds the research hypotheses and research specific objectives, section two presents the regression results; and the final section presents the discussion of the study findings presented in section two.

Data collected through secondary sources were used to determine the impact of road infrastructure on economic growth in Uganda. Secondary data were used to analyze the impact of road infrastructure on economic growth and in assessing whether there has been any improvement in the level of economic growth in Uganda. The study focused on the following research hypotheses:

Investment in roads infrastructure does not cause economic growth.

An increase in the coverage of paved road infrastructure doesn't lead to an increase in economic growth.

An increase in the coverage of unpaved road infrastructure doesn't lead to an increase in economic growth.

The study aimed at achieving the following specific objectives;

iv. To investigate the effects of investment in roads on economic growth in Uganda.

v. To investigate the relationship between coverage of paved roads and economic growth in Uganda.

vi. To determine the impact of coverage of un paved roads on economic growth in Uganda

### 4.2.0 Correlation Analysis

Before performing the regression estimation, correlation analysis was performed to see any possible correlation between variables. This approach can help to measure the strength of the regression results. That is, if for example, the correlation analysis indicates the positive

association between dependent variables selected above and economic growth, then, the regression analysis should also indicate the same. Otherwise, the results will be sensitive to change in method and specification and thus can be concluded to be weak.

The correlation coefficient matrix is presented in Table 4.1 reveals that all variables are highly correlated with the economic growth since their coefficient values are positive

That is;

## 4.2.1 The Effects of Investment in Roads Infrastructure On Economic Growth In Uganda

This was obtained using correlation co efficient as shown below;

**Table 4.2.1 showing relationship between investment in road infrastructure and economic growth in Uganda 2000/2018.**

|          | IRI      | GDP |
|----------|----------|-----|
| Column 1 | 1        |     |
| Column 2 | 0.852059 | 1   |

KEY  **GDP**- Growth domestic product, **IRI**- investment in road infrastructure

0.852059 implies a strong positive correlation of for investment in road infrastructure and economic growth in Uganda as portrayed by the GDP.

## 4.2.2 The Relationship between Coverage Of Paved Roads And Economic Growth In Uganda.

This was also obtained using correlation coefficient as shown below;

**TABLE 4.2.2 showing relationship between coverage of paved roads and economic growth.**

|  | *CPR* | *GDP* |
|---|---|---|
| CPR | 1 |  |
| GDP | 0.852059 | 1 |

KEY **GDP**- Growth Domestic Product, **CPR**-Coverage of Paved Roads

0.852059 implies a strong positive correlation for the coverage of paved roads and economic growth rate in Uganda as portrayed by the GDP.

## 4.2.3 The impact of Coverage of Un paved roads on Economic growth in Uganda.

Also correlation coefficient was used and the results are shown below;

**Table 4.2.3 Showing relationship between coverage of Un paved roads and Economic growth in Uganda.**

|  | *CUPR* | *GDP* |
|---|---|---|
| CUPR | 1 |  |
| GDP | 0.925423 | 1 |

KEY; **CPUR**- Coverage of Un paved Roads, **GDP**- Growth Domestic Product,

0.925423 implies a strong positive relationship between coverage of Un paved roads and economic growth as portrayed by the GDP.

Key: **GDP**- Growth Domestic Product, CPR-Coverage of Paved Roads, CPUR- Coverage of Un paved roads, IRI- Investment in Road Infrastructure.

These results are consistent with both theoretical and empirical expectation. Government investment in road infrastructure and increase in coverage of both paved and un paved roads contribute directly and indirectly to economic growth. For instance, increase in the coverage of paved and un paved roads enables trade and investment through encouraging mobility of resources and end products to market places. Furthermore, investment in road infrastructure results into reduced road accidents there by resulting into low mortality rates which leads to growth of human capital and as the result encouraging domestic production.

Key: GDP- Growth domestic product, GDPP-Growth domestic product per capita, CPR-coverage of paved roads, CPUR- coverage of Un paved roads, IRI- investment in road infrastructure.

## 4.3.0 Regression Results

In this section, the results for regression analysis are presented. Since this study employs the disaggregated approach to evaluate the impact of road infrastructure on economic growth, only one regression model was estimated. This regression model aimed at evaluating the impact of government expenditure of these three variables (i.e. Investment in road infrastructure, coverage of paved roads, coverage of un paved roads) on economic growth. The test statistics sometimes called summary statistics include the t-test statistics for ascertaining the statistical significance of the estimated coefficients using percentage levels. The coefficient of determination is to ascertain the percentage of contribution of the independent variables on the dependent variable. Finally the F- statistic is used for the overall significance of the equation.

Table 4.3.0 presents the regression results for road infrastructure and economic growth.

From the below, the results show that all signs of independent variables are positively related on economic growth which are correctly in line with the prior expectations.

## Table 4.3.0 Showing Regression results of Road infrastructure and Economic grawth

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|---|---|---|---|---|---|---|---|---|
| rcept | 8.578533593 | 2.453610674 | -3.49629 | 0.00324817 | -13.8083 | -3.34879 | -13.8083 | 3.348786237 |
| R | 0.002387959 | 0.001173588 | 2.03475 | 0.03994855 | -0.00011 | 0.004889 | -0.00011 | 0.004889403 |
| PR | 0.000823489 | 0.000141794 | 5.807654 | 3.452E-05 | 0.000521 | 0.001126 | 0.000521 | 0.001125715 |
| | 0.013222047 | 0.004222456 | 3.131364 | 0.00686296 | 0.004222 | 0.022222 | 0.004222 | 0.022221998 |

Number of observations = 19, F (3, 15) = 122.70076, R-square = 0.96084

Adjucent R-square = 0.953015, MSE = 399.8659, ESS 3.25887

## 4.3.1 Regression equation

GDP = 8.578533593 + 0.002387959 $IRI_t$ + 0.000823489 $CPR_t$ + 0.013222047 $CUPR_t$ + $\varepsilon$

Source: Excel Regression Result

## 4.4.0 Discussion of the Results

The study intended to test the hypothesis that there exist positive relationship between road infrastructure and economic growth of Uganda and the significance of the models used in determining the relation between road infrastructure and economic growth. The regression results reveal that when government increases investment in roads by one unit, the rate of economic growth will increase by 0.013222 percent, if government increases in coverage of paved roads by one unit, the rate of economic growth will grow by 0.002387959 and if government increases the coverage of un paved roads by one unit, the rate of economic growth will be 0.000823489

Also since the P-Values of the dependent variables are less than 0.05, then they are significant That is CPR =0.039948, CUPR=0.0000345 IRI=0.00686296.

These results are consistent with correlation results, theoretical and empirical expectation. From theoretical perspective, government investment in road infrastructures and increase in coverage of paved and un paved roads are very important factor for economic growth.

# CHAPTER FIVE

## CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

### 5.1.0 Introduction

This chapter presents a summary of the findings and draws conclusions on effect of road infrastructure on economic growth based on the findings. It also includes policy recommendations and areas for further research.

### 5.2.0 Conclusion

This study focused on the effect of government expenditure on road infrastructure (both paved and unpaved) would have on economic growth of the country. It was established that in the long run a percentage increase in both paved and unpaved road had effects on the economic growth. Short run analysis too established a positive effect from road infrastructure to economic growth. This helped to test the hypothesis which confirmed that government expenditure on road infrastructure would accelerate the growth of the economy and this is strengthened by the positive causal relationship. It is however, important to note that the study only concentrated on national roads and left out district roads due to the difficulty in obtaining data. Road transport remains the major mode facilitating movement of goods and people across the country to accelerate economic and business activities given the fact that Uganda is land locked. Similarly important to note is that the other capital stock variable has a very high significant value to GDP

### 5.3.0 Recommendations

Arising from the conclusion are the following recommendations:

From the findings, the study recommends for increased construction and regular maintenance of the unpaved roads. This has an advantage in way that the paved roads have a long life span compared to the unpaved roads. It will also help in providing increased access of rural areas to the various markets consequently stimulating the agricultural sector and also will increase the country's competitiveness especially in the East African region through the reduced transaction costs brought about by increased access across borders. Putting much emphasis on the paved

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road has a great advantage in that the road can be used throughout the year as opposed to the unpaved that become dusty during the dry season which impact health hazards to the populace and impassable during heavy rains seasons. Following the granger causality test its clear that unpaved road which connects most rural areas should be increased in terms of length due to the multiplier effect of the unpaved roads, brought about by boosting up tourism, increasing access to medical facilities, as well as linking up markets to farmland. Similarly due to the long duration periods of paved roads the government needs to increase its coverage in order to sustain its economic growth.

Directly investment in road infrastructure has been found out to have a positive effect on GDP as such there is need for both government and the private sector to increase their investment. On the side of government, it needs to concentrate on investments which require lump sum capital with low rates of returns for example in the energy sector ,railway reconstruction to supplement road transport as well as provide a conducive investment atmosphere to attract foreign investors. This may be in form of ensuring security in all parts of the country, tax incentives as well as availing relatively affordable investment loans to investors

## 5.4.0 Areas for Further Research

This study examined the effect of the infrastructure provision to the economic growth of Uganda and established a positive relation between paved road and economic growth. It was also established that, the country has low supply of road infrastructure to bring about sustainable growth of the economy. It is also important to note that the study mainly concentrated on national roads leaving out district and local council roads, future studies are therefore encouraged to find out the effect of all roads on the economic performance of the country.

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# APPENDICES

## Appendix 1; the regression out put

### SUMMARY OUTPUT

| Regression Statistics | |
|---|---|
| Multiple R | 0.980227508 |
| R Square | 0.960845967 |
| Adjusted R Square | 0.953015161 |
| Standard Error | 1.805234163 |
| Observations | 19 |

### ANOVA

| | df | SS | MS | F | Significance F |
|---|---|---|---|---|---|
| Regression | 3 | 1199.597689 | 399.8659 | 122.700767 | 8.89E-11 |
| Residual | 15 | 48.88305577 | 3.25887 | | |
| Total | 18 | 1248.480745 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | L 95 |
|---|---|---|---|---|---|---|---|
| Intercept | -8.578533593 | 2.453610674 | -3.49629 | 0.00324817 | -13.8083 | -3.34879 | -13 |
| CPR | 0.002387959 | 0.001173588 | 2.03475 | 0.03994855 | -0.00011 | 0.004889 | -0.0 |
| CUPR | 0.000823489 | 0.000141794 | 5.807654 | 3.452E-05 | 0.000521 | 0.001126 | 0.00 |
| IRI | 0.013222047 | 0.004222456 | 3.131364 | 0.00686296 | 0.004222 | 0.022222 | 0.0 |

**Appendix 2; a table of data set used**

## A TABLE OF DATA SET USED

| YEAR | Paved roads (km) | Un paved roads (km | Road mentenance funding (b | Population size | GDP(Billion $) | GDP per capita $ | Economic grawth rate ( |
|------|------|------|------|------|------|------|------|
| 2000 | 2565 | 6987 | 295.4 | 24039274 | 6.193 | 257.63 | 9 |
| 2001 | 2642 | 7002 | 320.8 | 24852965 | 5.841 | 234.98 | 5.5 |
| 2002 | 2700 | 7009 | 352.8 | 25722729 | 6.179 | 240.24 | 3.8 |
| 2003 | 2742 | 7023 | 360.2 | 26624578 | 6.337 | 238 | 8.1 |
| 2004 | 2751 | 7029 | 360.5 | 27574906 | 7.94 | 288.02 | 5.4 |
| 2005 | 2781 | 7031 | 374.2 | 28543940 | 9.014 | 315.79 | 8.7 |
| 2006 | 2837 | 7043 | 387.6 | 29550334 | 9.943 | 336.46 | 7 |
| 2007 | 2848 | 7052 | 384.8 | 30590056 | 12.29 | 401.85 | 8 |
| 2008 | 2968 | 7532 | 433.2 | 31668501 | 14.24 | 449.69 | 10.4 |
| 2009 | 2989 | 17011 | 392.6 | 32776789 | 18.17 | 554.4 | 8.1 |
| 2010 | 3112 | 16888 | 443.9 | 33915133 | 20.19 | 595.21 | 7.7 |
| 2011 | 3264 | 17120 | 632.4 | 35095679 | 20.18 | 574.92 | 6.8 |
| 2012 | 3317 | 17683 | 723.1 | 36312274 | 23.11 | 636.64 | 2.2 |
| 2013 | 3489.6 | 17510 | 831.6 | 37550833 | 24.6 | 655.05 | 4.7 |
| 2014 | 3795 | 16979 | 852.5 | 38834650 | 27.29 | 702.8 | 4.6 |
| 2015 | 3919 | 16625 | 982.9 | 40144870 | 27.1 | 675.12 | 5.7 |
| 2016 | 4157 | 16387 | 734.8 | 41487965 | 24.08 | 580.38 | 2.3 |
| 2017 | 4257 | 16351 | 777.5 | 42862958 | 25.89 | 604.04 | 5 |
| 2018 | 5100 | 16420 | 823.3 | 44270563 | 27 | 684.37 | 6.2 |