THE RELATIONSHIP BETWEEN GOVERNMENT INVESTMENT IN INFRASTRUCTURE AND ECONOMIC GROWTH IN KENYA

BY

JAMES MUTURI MBURU

D63/79234/2012

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN FINANCE OF THE UNIVERSITY OF NAIROBI

OCTOBER 2013

DECLARATION

This Research project is my original work and has not been presented in any other University.

Signed…………………………………… Date …………………………………..

JAMES MUTURI MBURU

REG N0: D63/79234/2012

This research project has been submitted for presentation with my approval as University Supervisor.

Signed…………………………………… Date …………………………………

Supervisor: MR. IRAYA

Department of Finance and Accounting,

School of Business,

University of Nairobi

ACKNOWLEDGEMENTS

First and foremost I would like to offer my sincerest gratitude to my kind supervisor, Mr. Cyrus Iraya, who has supported me throughout my project with his patience and knowledge and having spared his time to go through this work and in the process rendered valuable advice and corrections which led to the realization of this research project. I attribute the level of my Master's degree to his encouragement and effort and without him this project would not have been completed. Special gratitude also goes to my moderator Mr. Herrick Ondigo for his valuable advice and contributions that have enabled me complete this research project.

I would like to thank my family members, especially my wife, Phoebe Njeri and My lovely son, Dennis Mburu for supporting and encouraging me to pursue this important degree.

I acknowledge the valuable time and technical assistance received from the Management of Kenya National Bureau of Statistics (KNBS) for allowing me use their library and collect data from their publications.

Finally I am greatly indebted to God, without whom I would not have succeeded in my academic journey.

DEDICATION

This research project is dedicated to my lovely wife Phoebe Njeri Muturi and my lovely son Dennis Mburu Muturi, your love, encouragement and understanding kept me going all through.

ABSTRACT

Core economic infrastructure in the areas of energy, transportation, and water and sewerage – has always played important roles in maintaining economic performance. However, the rate of public investment in these core areas began falling in the 1970s and has not returned to its previous levels since then. The Kenyan public infrastructure has deteriorated badly after the past generation of neglect. With no doubt, the result of declining and insufficient investments has been a worsening infrastructure deficit and mounting investment needs. The objective of this study therefore, was to establish the relationship between government investment in infrastructure and economic growth in Kenya.

This study adopted a descriptive research design. In this study emphasis was given to secondary data which was obtained from the Government development expenditure in infrastructure obtained from Economic Survey reports published by the Kenya National Bureau of Statistics. The data included the government investments in infrastructure and also economic growth data from CBK covering a period of ten years between 2005 and 2012. In order to test the relationship between the variables the inferential tests including the regression analysis was used.

The study found that, government investment in infrastructure development had a positive and significant effect on economic growth in Kenya for the period of this study. The study recommends that adequate funding should be directed towards infrastructure projects preparation, implementation and maintenance. The study suggests that proper reform policy should be complemented with the availability of necessary infrastructures that are important for the economic development in the country. There should be established Initiative focusing on the political championing

and sponsoring of specific infrastructure projects with potential impact on economic integration. Emphasis should also be given on developing public-private partnerships (PPPs) and encourage increased joint-venture project development between multinational firms and local enterprises for infrastructure development.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

CBK - Central Bank of Kenya

CBO - Community Based Organization

GDP - Gross Domestic Product

GNP - Gross National Product

KNBS - Kenya National Bureau of Statistics

KSCE- Kenya Society of Civil Engineers

OECD - Organisation for Economic Co-operation and Development

R&D - Research and Development

SPSS - Statistical package for social scientists

TIDE - Theory of Institutional Deficiencies

US - United States

VAR - Vector auto Regression

WSB - Water Service Board

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Adequate and well maintained infrastructure is a necessarily condition for economic growth and poverty reduction. Access to roads, water, sewer, communication technologies, and electricity are all essential to the economy (Kemp, 2005). Public infrastructure investment can boost productivity by enhancing the productivity of existing infrastructure resources and by increasing the resource base of an economy by adding new infrastructure. Although the government is the major investor in this sector, other capital intensive services compete for limited local resources.

Physical, technological and social infrastructure is a necessary condition for economic growth and industrial advancement. The availability of quality infrastructure has long been recognized as a critical input to productivity and competitiveness. Internationally, the Global Economic Forum's *World Competitiveness Yearbook* cites infrastructure as the second pillar of competitiveness (World Economic Forum, 2010) and the UK Government has included capital investment as one of the Five Drivers of Productivity. The OECD has also pointed to the positive effect that government investment has on per-capita output growth (OECD, 2003).

The quality and quantity of the stock of economic infrastructure is a key element of the supply-side potential of the Irish economy and a critical input to productivity and competitiveness. It consists of transport networks necessary to move people and goods, vital energy to power industrial production and broadband and interconnection capacity for the exchange of information and ideas (Daffin and Hobbs, 2011).

From the perspective of economic growth, infrastructure investments not only have larger multiplier effects than other types of spending to get the economy moving, but also improve the society's productivity, which is the ultimate driving force the economy relies on to foster. Such investments would also have significant positive impacts on the overall employment through direct, indirect and induced effects (Bigman, 2002).The idea that more spending on infrastructure fosters the economy is intuitively understandable, but by what means these effects are achieved and the ultimate reasons behind it is rarely studied.

1.1.1 Government Investments in Infrastructure

In most developing and transition countries, insufficient resources to finance long-term investment are a major problem. This lack of finance is a big set-back to economic growth and this is making it more difficult to achieve the millennium development goals (MDGs) by 2015 as set by the United Nations. Infrastructure is a heterogeneous term, including physical structures of various types used by many industries as inputs to the production of goods and services (Chan et al., 2009). This description encompasses "social infrastructure" (such as schools and hospitals) and "economic infrastructure" (such as network utilities). The latter includes energy, water, transport, and digital communications. They are the essential ingredients for the success of a modern economy and the focus of this paper (Stewart, 2010).

Infrastructure suffers from a series of market failures that impede the optimal level of investment from being reached. What usually sets investment in infrastructure apart from other types of investment is its long-term, capital intensive nature - it typically generates long-lived assets with high sunk costs. This creates a gulf between (short term) marginal and (long term) average costs, which in turn, creates a time-

inconsistency problem. Problems of underinvestment in infrastructure are strongly related to risks and biases, resulting in policy uncertainty, complexity and the lack of a holistic strategy that damage investment prospects, mainly in the energy and transport sector (CBI, 2012a).The infrastructure deficit is most evident in low-income countries and fragile states. Among the poor sectors, the power sector is lagging most in terms of generation capacity, electricity consumption and security of supply.

1.1.2 Economic Growth

Economic growth is the percentage increase in real national output in a given time period or a sustained increase in the productive potential of an economy. Countries grow at different rates. Partly this is the simple fact that they are at different stages of their economic cycle (Clark, 2007). Economic growth is concerned with the long-run trend in production due to structural causes such as technological growth and factor accumulation. The business cycle moves up and down, creating fluctuations around the long-run trend in economic growth. Economic growth has traditionally been attributed to the accumulation of human and physical capital, and increased productivity arising from technological innovation.

Economic growth was also the result of developing new products and services, which have been described as "demand creating" (Smil, 2004).The concern about economic growth often focuses on the desire to improve a country's standard of living – the level of goods and services that, on average, individuals purchase or otherwise gain access to. It should be noted that if the population grows along with economic production, increases in GDP do not necessarily result in an improvement in the standard of living. When the focus is on standard of living, economic growth is expressed on a per capita basis.

Kenya's economy is market-based, with a few state-owned infrastructure enterprises, and maintains a liberalized external trade system. The country is generally perceived as Eastern and central Africa's hub for Financial, Communication and Transportation services. As at May 2010, economic prospects are positive with 4-5% GDP growth expected, largely because of expansions in tourism, telecommunications, transport, construction and a recovery in agriculture. These improvements are supported by a large pool of English speaking professional workers. There is a high level of computer literacy, especially among the youth. The government, generally perceived as investment friendly, has enacted several regulatory reforms to simplify both foreign and local investment. An increasingly significant portion of Kenya's foreign inflows is from remittances by non-resident Kenyans who work in the US, Middle East, Europe and Asia. Compared to its neighbors, Kenya has a well-developed social and physical infrastructure. It is considered the main alternative location to South Africa, for major corporations seeking entry into the African continent (Bigman, 2002).

In 2006 Kenya's GDP was about US$17.39 billion. Per capita GDP averages somewhat more than US$450 annually. Adjusted in purchasing power parity (PPP) terms, per capita GDP in 2006 was about US$1,200. The country's real GDP growth picked up to 2.3 percent in early 2004 and to nearly 6 percent in 2005 and 2006, compared with a sluggish 1.4 percent in 2003 and throughout President Daniel Arap Moi's last term (1997–2002). Real GDP is expected to continue to improve, largely because of expansions in tourism, telecommunications, transport, and construction and a recovery in agriculture. The Kenya Central Bank forecast for 2007 is between 5 and 6 percent GDP growth. GDP composition by sector, according to 2004 estimates, was as follows: agriculture, 25.7 percent; manufacturing, 14.0 percent; trade,

restaurants, and hotels, 13.8 percent; transport and communications, 6.9 percent; government services, 15.6 percent; and other, 24.0 percent (Branch, 2011).

The Gross Domestic Product (GDP) in Kenya expanded 0.50 percent in the first quarter of 2013 over the previous quarter. GDP Growth Rate in Kenya is reported by the Kenya National Bureau of Statistics. Kenya GDP Growth Rate averaged 1.15 Percent from 2005 until 2013, reaching an all-time high of 3.50 Percent in March of 2010 and a record low of -2.40 Percent in March of 2008. Kenya is one the most developed countries in East Africa. Agriculture and Fishery (including coffee and tea cultivation) is the largest sector of the economy and accounts for about 25 percent. The fastest growing segments are Wholesale and Retail Trade and Transport and Communication. Together they account for almost 27 percent of total output. Manufacturing is the third largest sector and represents 11 percent of the GDP. Other sectors include: Real Estate, Renting and Business Services and Financial Intermediation (10.8 percent), Education (6.7 percent), Other Services (7 percent), Construction (4 percent), Public Administration (3.7 percent), Electricity and Water (2.6 percent), Hotels and Restaurants (1.5 percent). Fishing and Mining and Quarrying account for the remaining 1 percent

1.1.3 Government Investment in Infrastructure and Economic Growth

The one most important reason for the tremendous benefits that infrastructure investment would bring along is its effects on expanding the economy's long-term productive capacity. Conceptually, infrastructure may affect aggregate output in two main ways: (i) directly, considering the sector contribution to GDP formation and as an additional input in the production process of other sectors; and (ii) indirectly, raising total factor productivity by reducing transaction and other costs thus allowing

a more efficient use of conventional productive inputs. Infrastructure can be considered as a complementary factor for economic growth. Infrastructure investment is complementary to other investment in the sense that insufficient infrastructure investment constrains other investment, while excessive infrastructure investment has no added value. To the extent that suboptimal infrastructure investment constrains other investment, it constrains growth (Newbery, 2012).

Infrastructure investment contributes to economic growth by expanding the productive capacity of a locality, region, state, or the nation as a whole. A new highway, for example, allows for increased transportation of people, goods, and services. But it does more. It creates opportunities for increased commerce as businesses will locate near the new road, providing additional jobs and output. Investments can enhance the productivity of existing public infrastructure resources and increase the resource base of an economy through the addition of new infrastructure. Therefore public investment lowers the total production costs for private companies (Munnell, 2008). Public infrastructure investment can also contribute to economic growth through the expenditures associate with purchasing, installing, operating, and maintaining the infrastructure itself.

The economic impact of public infrastructure is likely to depend on how additional investment is financed. Increases in taxes are widely considered to reduce the rate of economic growth. Therefore, an increase in public infrastructure stimulates economic growth only if the impact of public infrastructure outweighs the adverse impact of higher taxes needed to finance the investment, and outweighs the adverse impact of spending cuts in other area such as operations and maintenance (Romp and Haan, 2005). Infrastructure improvements can increase labor productivity—e.g. more

efficient transportation systems to and from work reduce wasted time. Better infrastructure can also reduce fossil fuel consumption specifically, and overall energy consumption more generally. This reduces greenhouse gas emissions, and thus the environmental barriers to economic growth.

Economic benefits also depend on the geographic source of the money and the geographic area of benefit under consideration. Young (2005) argues when the benefits of project investments are localized but costs are paid by the national government, total economic benefits across the national economy are zero. In a properly functioning competitive economy (fully employed resources) a new investment yields no net benefits beyond its own net income. Expansion in secondary sectors in one region is offset by a fall in activity and profits elsewhere over the long run. Therefore, from a national perspective the multiplier effects of local projects financed by federal dollars would be offset by the multiplier effects of foregone alternative public investment (Young, 2005).

Public infrastructure investment can come from both the reinvestment and replacement of existing infrastructure (existing assets), and investment in new public infrastructure (adding assets at the margin). Beyond the replacement or addition of public infrastructure, there are also economic impacts associated with operations and maintenance (the provisioning of the service). Therefore, local decision makers may consider three ways that investment in infrastructure such as water, electricity and transport could create added value in the economy including capital reinvestment in existing public infrastructure (replacement, rehabilitation, etc.); capital investment in new public infrastructure and operation and maintenance of existing infrastructure.

1.1.4 Investments in Infrastructure in Kenya

In Kenya, investments in the infrastructure system feature a public-private partnership, and it is this combination of public and private investments that maintains and improves the country's core infrastructure. Although railroads, electric utilities, many hub airports, and gas companies represent the private side of infrastructure provision, it is often with the aid of the public sector. Moreover, most assets in core infrastructure are public and government plays a pivotal role in supplying the infrastructure needs of the nation (Ryan, 2012). However, the importance of public assets for the efficient functioning of the economy often is unrecognized.

The inadequate rate of public investment in the past 30 years has resulted in the deficiency and obsolescence of infrastructure in Kenya. The Government of Kenya is seeking to extend and deepen its partnership with the private sector to raise more private investment and expertise to accelerate infrastructure capital formation (Kimenyi, Mbaku, and Mwaniki, 2009). The new initiative, through the recently approved Public-Private Partnership (PPP) Policy, will increase private participation in Kenya's infrastructure market across sectors to support national economic growth and employment creation. Kenya spends about US$1.6 billion a year on infrastructure but requires a sustained expenditure of US$4 billion a year, or about 20 percent of its Gross Domestic Product (GDP), over the next decade, according to the Africa Infrastructure Country Diagnostic Report 2010 produced by the World Bank in collaboration with the African Development Bank and other development agencies.

It is noteworthy that a number of landmark investment projects have been implemented under the umbrella of Vision 2030. The government has identified pipeline projects including three that are ready for financing under this structure once

a PPP framework is in place. The projects, described as "first-mover" highest priority for IFPPP support, are in transport, energy, technology and trade (Republic of Kenya, 2009). Government investment can be made more effective by re-directing it towards economic infrastructure. Furthermore, the issue of efficiency needs to be considered to ensure public investment is made more productive. The policy recommendation therefore is for the government to improve the productivity of its investment so as to generate positive returns and enhance its complementary role to private sector. One of the concerns on the development of the water services sector is the absence of a clear positive correlation between a continually growing development budget and the impact on the ground. The main reason for this is inadequate investment planning and monitoring.

1.2 Statement of Problem

Existing public infrastructure stocks affect the marginal productivity of new infrastructure. Assuming diminishing returns, a large increase in the public infrastructure stock is expected to have a large economic impact if the previous stock was small. Despite the importance of marginal impacts, many empirical studies focus on the average productivity of public infrastructure and cannot be used to assess whether the existing stock is efficient or if investment in new public infrastructure is necessary (Romp and Haan, 2005).

Since the late 1980s, academic interest in the role of public investment and economic growth has been revived. This was largely motivated by declines in public investment in the early 1970s and falls in economic productivity growth at roughly the same time. Arguments by Aschauer (1989)and others that there were significant linkages between economic growth and public infrastructure investments fueled the discussion.

However, many of the early studies were controversial because of their sensitivity to small changes in data and methodological issues (OECD. 2006). The wide range of estimates made the results of older studies difficult to interpret from a policy perspective. Key points of concern in these early studies focused on methodological and econometric difficulties including causality and correlation (Romp and Haan, 2005; Gramlich, 2004).

Core economic infrastructure in the areas of energy, transportation, and water and sewerage – has always played important roles in maintaining economic performance. However, the rate of public investment in these core areas began falling in the 1970s and has not returned to its previous levels since then. The Kenyan public infrastructure has deteriorated badly after the past generation of neglect. According to the World Bank Country Director for Kenya, Johannes Zutt, Kenya faces a significant infrastructure financing deficit estimated at US$2.1 billion annually, and this imposes a serious constraint to growth and doing business in Kenya. Zutt indicated that Kenya's per capita growth rate can be increased by three percentage points if infrastructure financing is increased to the average of a middle income country.

With no doubt, the result of declining and insufficient investments has been a worsening infrastructure deficit and mounting investment needs. According to the 2009 Report Card for Kenya's Infrastructure by the Kenya Society of Civil Engineers (KSCE), Kenya. Infrastructure, including aviation, bridges, dams, drinking water, energy, hazardous waste, inland waterways, levees, public parks and recreation, rail, roads, school, solid waste, transit and wastewater, received an average grade of D. Besides its negative influences on productivity improvement, such deficiency in

infrastructure will also deeply affect economic growth, which becomes even more critical in the slump of the current crisis.

Locally, studies done in the public infrastructure include Rimberia (2012) who did a study on the determinants of sustainability of water projects in Kieni East Division, Nyeri County; Lepartobiko (2012) who did a study on the factors that influence success in large construction projects the case of Kenya Urban Roads Authority Projects and Sang (2012) who conducted a study on the effect of electricity interruption on micro business enterprises in Nairobi CBD. None of the study focused in the relationship between government investment in infrastructure and economic growth in the Kenyan situation. This study therefore seeks to fill this gap by answering the question: What is the relationship between government investment in infrastructure and economic growth in Kenya?

1.3 Objective of the Study

The aim of the study was to establish the relationship between government investment in infrastructure and economic growth in Kenya

1.4 Value of the Study

Kenya just like the rest of the developing countries is experiencing a radical change in the community based management system of public resources including infrastructure in the recent past. This study is relevant as it attempts to establish the relationship between government investment in infrastructure and economic growth. It will also shed some light on the problems of management and sustainability of public infrastructure.

The study is invaluable to the policymakers who have a perverse incentive to invest in new public infrastructure projects that are politically more attractive than continuing or improving maintenance activities. However, the economic impacts of annual operations and maintenance spending should not be forgotten. Additionally, indirect impacts from some types of investment, especially benefits from ecosystems services, should be considered. Ultimately, understanding the full spectrum of investment options and the direct and indirect impacts of each type of investment can help inform Government decision makers and help ensure that economic, environmental, and social goals are achieved. Project managers and policy-makers need to assess the entire range of government interventions to understand fully the economic, social and environmental impacts on a given sector, region or group of people.

To the government of Kenya, the study provides information that can be used in the formulation of policies related to sustainability of public infrastructure projects in Kenya. The findings of this study can also be used by the government to promote development projects in rural and urban areas by increasing the sustainability of public infrastructure.

The finding is important to academics and researchers as basis for further researches. The study provides the background information to research organizations and scholars who may want to carry out further research in this area. The study can facilitate individual researchers to identify gaps in the current research and carry out research in those areas.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this second chapter, relevant literature information that is related and consistent with the objectives of the study is reviewed. Important issues and practical problems are brought out and critically examined so as to determine the current facts. This section is vital as it determines the information that link the current study with past studies and what future studies will still need to explore so as to improve knowledge. The literature is mainly on the relationship between government investment in public infrastructure and economic growth. The specific areas covered include theoretical review, empirical review and finally conclusion or chapter summary.

2.2 Review of Theories

This section focused on the various theories guiding the study by specifically discussing the endogenous growth theory, game theory, development theory and institutional theory.

2.2.1 Endogenous Growth Theory

The deficiencies in the neoclassical growth model led to the development of endogenous growth theory. The incorporation of R&D variables and imperfect competition into the growth framework began with Romer (1990). Other significant contributors include Aghion and Howitt (1992). In the endogenous growth model, technological advances result from R&D activity, and technological progress and knowledge accumulation are treated as endogenous variables, thus it is also termed the endogenous growth theory. According to the model, the long-run growth rate depends on a stable business environment: government policies and actions on

taxation, law and order, provision of infrastructure services, protection of intellectual property rights, and regulation of international trade, financial markets, and other aspects of the economy. Hence, the government guides long-term growth.

Investment is also an important determinant in the endogenous growth theory model, allowing improvement in productive capacity, and increasing profits that lead to growth. The neoclassical growth theory assumes that, following the law of diminishing returns, investment has a limited role in promoting economic growth and a continuous increase in the factors of production (investment) is unlikely to yield growth. Under endogenous growth theory and despite the law of diminishing returns, marginal factor productivity can be increased. For example, technical progress that is funded by capital investment increases productivity. Also, the endogenous growth approach argues that there is a role for government institutions that can overcome any market failures associated with the various types of investment. Hence, investment in public infrastructure is crucial to economic development and growth. Further, endogenous growth theory states that the improved investment drives growth; thus, investment may contribute to a long- run rate of economic growth (Economic Planning Advisory Commission, 1995).

2.2.2 Game Theory

Game theory highlights the rational mechanisms underpinning individual decision-making in a collective action contributing to the common good. In this case, the game theory can help to understand how participation in, or exclusion from a community project occurs (Cooke and Kothari, 2001). The options (voluntary or involuntary) for the government in which a development project is introduced are either to be excluded (not to participate), or to be included (to participate).

The attraction of game theory lies in its simple representation of a variety of situations in a single table. "The actions of the first player form the rows and the actions of the second player the columns, of a matrix. The entries in the matrix are two numbers representing the utility or payoff to the first and second player respectively" (Levine, 2000). A second feature of game theory is that it shows how decision-making at the individual level is supported by a rational calculus of personal gains (or capabilities) against the pursuit of the common good. This rational calculus depends on the different characteristics of the community and its members.

Game theory can be adapted to the analysis of any process, provided that relevant variables feed into it. In our case, choice government investment in public infrastructure project variables give shape to game theory and ensure a more comprehensive analysis of the economic development (Munnell, 2008). Thus, growth does not slow as capital accumulates, but the rate of growth depends on the types of capital a country invests in especially in the public infrastructure.

2.2.3 Development Theory

In order to explore institutional theory's relationship to current international development practice, it is necessary to first understand the theoretical and practical foundations of the type of development undertaken by modern development agencies. Development theory as a field evolves continually, and past theory and practice have bearing on how agencies currently develop and enact policy (Gramlich, 2004).

How the investment in public infrastructure project and their outcomes is addressed depends on how the government and development agencies currently conceptualize development, and how the philosophies that government and the citizens subscribe to affect their work (Gramlich, 2004).Within development literature there is a strong

15

focus on institutions: building institutions, fortifying institutions, ensuring projects' integration with existing institutions, etc. (Lepenies, 2008). Thus, the government and the various agencies dealing with public infrastructure investments should consider the developmental effect of the investments.

2.2.4 Institutional Theory

According to institutional theory scholar Scott (2004) "…institutions are seen to serve vital social functions, including rule setting and enforcement and the promotion of comprehensibility, legitimacy, and social stability". Institutions, with their promise of stability, offer steadiness to the unpredictable and volatile project environment, and represent more sound investments for development organizations. Yet despite international development's declared interest in institutions and institution building, there has been little scholarly application of institutional theory to the field of international development.

Powell and DiMaggio (1991) define an emerging perspective in organization theory and sociology, which they term the 'new institutionalism', as rejecting the rational-actor models of classical economics. Instead, it seeks cognitive and cultural explanations of social and organizational phenomena by considering the properties of supra-individual units of analysis that cannot be reduced to aggregations or direct consequences of individuals' attributes or motives.

Scott (2004) indicates that, in order to survive, organizations must conform to the rules and belief systems prevailing in the environment because institutional isomorphism, both structural and procedural, will earn the organisation legitimacy (Dacin, 1997; Deephouse, 1996; Suchman, 1995).

There is substantial evidence that firms in different types of economies react differently to similar challenges (Knetter, 1989). Social, economic, and political factors constitute an institutional structure of a particular environment which provides firms with advantages for engaging in specific types of activities there.

Martinsons (1998) developed a theory of institutional deficiencies (TIDE) suggesting that relationship-based commerce will prevail where rule-based markets cannot flourish due to institutional deficiencies. Martinsons (2008) extends TIDE to show how the development of relationship-based e-commerce in China has resulted from that country's lack of trustworthy and enforceable set of rules for doing business. His theory suggests that factors such as personal connections, informal information, and blurred business-government relations (which also encourage corruption) will constrain the transition from the physical marketplace to the general economic growth. The investments in public infrastructure would therefore tend to perform more efficiently and achieve the expected developmental and economic outcome if they receive the institutional support.

2.3 Overview of Economic Growth

Economic development and economic growth, both progressive economic phenomena, are closely related. Until the 1960s, economic development theory was treated as an extension of conventional economic theory and therefore development was merely equated to growth. Growth, in this sense, is simply defined as an increase in national production (Hall, 1983). However, Dudley (1969) earlier argued that development should not be narrowly confined to growth; it should include social equity aspects, such as reduction and elimination of poverty, inequality, and unemployment.

Later, the economist Todaro (1989) broadened the concept of development to be conceived of as a multidimensional process involving major changes in social structures, popular attitudes, and national institutions, as well as the acceleration of economic growth, the reduction of inequality and the eradication of absolute poverty.

Economic development, according to Todaro (1989), incorporates the social factors of education and health improvements, and environmental protection; with the economic benefits of efficient allocation of resources, and sustainable growth. Defining economic development through civic society concepts as well as those relating to the public and private sectors results in potential factors that are qualitative and rarely quantifiable (Jomo&Reinert, 2005). Further, Hirschmann (1958) noted that, depending on economic needs or priorities, a government's focus for development can vary by country and by the times. Since the concept is broad and derived from qualitative factors, the measurement of development remains a challenge. However, the majority of empirical economists argue that accurate measurement of quantifiable outcomes can provide a proxy for the contributions of non-quantifiable effects.

To measure the effects of public investment in infrastructure for this study, a quantifiable indicator to approximate development is required. Economic growth is the leading indicator for this task, as it can be measured through Gross National Product (GNP) or Gross Domestic Product (GDP) and these are generally used as a proxy for overall economic development (Sen, 1988). Gross Domestic Product (GDP) is the most commonly used statistic and it's measured at market prices (includes indirect taxes) and includes imports and exports while Gross National Product (GNP) is equal to the GDP plus income earned abroad on investments and other assets minus income paid to foreigners on their investments. It is conventionally

measured as the percent rate of increase in real gross domestic product, or real GDP. Growth is usually calculated in real terms – i.e., inflation-adjusted terms – to eliminate the distorting effect of inflation on the price of goods produced. In economics, "economic growth" or "economic growth theory" typically refers to growth of potential output, i.e., production at "full employment".

2.4 Infrastructure Investment and Economic Growth

Infrastructure investment is one of the main preconditions for enabling developing countries to accelerate or sustain the pace of their development and achieve the Millennium Development Goals (MDGs) set by the United Nations in 2000. Furthermore, the future investment needs of developing countries in infrastructure far exceed the amount being spent by the governments, the private sector and other stakeholders, resulting in a significant financing gap. According to a World Bank estimate, on average, developing countries currently invest annually 3-4% of their GDP in infrastructure; yet they would need to invest an estimated 7-9% to achieve broader economic growth and poverty reduction goals (UNCTAD, 2008).

2.4.1 Transportation Infrastructure

Public Transport is afforded high priority in the Programme for Government. This is due to the contribution that an attractive public transport system can make not only to economic renewal and to the climate change agenda but importantly also to the citizen's daily lives. Investment in public transport facilitates alternatives to car transport, helping to reduce congestion and emissions and enabling the transport sector to cater for the demands associated with longer term population and employment growth in a sustainable manner (Barro, 2003).

The most important type of transport infrastructure is the road network (Crafts, 2009). The UK road network is the dominant means of transport, providing 73 per cent of passenger travel and 65 per cent of freight moved (Eddington, 2006).

2.4.2 Communication Infrastructure

According to analysis by Young (2005), the key infrastructure priority for enterprise development is the timely delivery of advanced broadband services. The widespread availability of advanced broadband infrastructure and services is essential to realizing future growth potential in existing and emerging sectors. It will also play a key role in supporting the growth of small businesses, capturing opportunities for productivity and innovation, supporting regional development, enabling greater public sector efficiency and marketing Kenya as a location for ICT-intensive FDI and R&D projects.

As services industries increasingly predominate the composition of the economy, technological infrastructure becomes all the more important for enterprise growth. The Government is committed to overseeing the provision of high-speed broadband across the country (Munnell, 2006).The role for the Government will continue to focus on avoiding the displacement of private sector activity, encouraging private sector investment through non-fiscal measures, and addressing particular instances of market failure.

2.4.3 Water Infrastructure

The relative neglect of water in public budgets and the low priority it receives in public investment allocations shows that the economic contribution of water in all its forms is not fully appreciated (Romp and Haan, 2005). Water is the lifeblood of the

economy - a medium essential for all life and livelihoods, as a key raw material for economic sectors and a binding constraint on their future growth.

Young (2005) posits that investment into water is a low risk investment compared to energy or information technology. As water funds follow a topic approach they do not fit into the traditional classification of funds such as industry, commodity, and technology or nourishment investment. Water funds typically invest along the value chain of water and across many different sectors. Investment into water is lasting because there is no substitute which could replace water (Young, 2005). Infrastructures, for instance water pipes, have a lifetime of up to one hundred years. The water sector is a stable, relatively slowly changing sector. Nevertheless, water funds cannot resist the ups and downs of the stock markets in the short-term.

Water provides four types of important economic benefits: commodity benefits; waste assimilation benefits; aesthetic and recreational benefits; and fish and wildlife habitats. Individuals derive commodity benefits from water by using it for drinking, cooking and sanitation. Farms, businesses and industries obtain commodity benefits by using water in productive activities. These commodity benefits represent private good uses of water which are rivals in consumption (e.g. one person's or industry's water use precludes or prevents its use by others). Government policies and regulations that concentrate on improving market access and competition are important means for improving the productive and allocative efficiency of the commodity uses of water (Romp and Haan, 2005).

The second and increasingly important economic benefit of water is waste disposal. Water bodies have a significant, but ultimately limited, assimilative capacity, meaning that they can process, dilute and carry away wastes. Recreation and aesthetic benefits

and fish and wildlife habitats were once regarded as luxury goods outside the concern of governments. Today, these two types of benefit are gaining increased attention. In developed countries, more and more people are focusing their recreational activities around lakes, rivers and seas. In developing nations, as incomes and leisure time grow, water-based recreation is becoming increasingly popular and an adequate supply of good-quality water helps provide a basis for attracting the tourist trade. Examples are cruises on the Nile in Egypt and visits to the Iguazú Falls on the Brazil-Argentina border. Likewise, information and knowledge about how humans have an impact on ecosystems have raised concern about the fish and wildlife benefits provided by water. Fish and wildlife habitats are related to both commodity and recreational uses (Young, 2005).

Waste assimilation and recreational and aesthetic values are closer to being public goods than private goods. Public goods are non-rivals in consumption - one person's use does not preclude use by others. For example, the enjoyment of an attractive water body does not deny similar enjoyment to others. Non-rival goods require large amounts of resources to exclude unentitled consumers from using the good. Exclusion costs are frequently very high for water services such as flood control projects and navigation systems. Goods and services that are non-rivals in consumption are normally better suited to public sector interventions, including ownership, provision and regulation (Munnell, 2008).

2.4.4 Energy Infrastructure

The Energy Information Administration forecasts that electricity use will increase by 29 percent by the year 2030 (EIA, 2009). New capital investments in electricity production, transmission, and distribution systems are needed to meet this demand.

More importantly, capital investments are needed to improve energy efficiency and to reduce greenhouse gas emissions. Per capita consumption of electricity is not expected to change much over the next two decades, largely due to expected improvements in efficiency and conservation (EIA, 2009). Without infrastructure improvements, increased energy demands will generate sizeable economic and environmental challenges. Natural gas currently represents the second most important source of energy for Kenya after petroleum. As part of a green energy transformation, we may not want to invest this heavily in the natural gas industry. However, any reduction in natural gas infrastructure will need to be at least matched by further investments in renewable energy and a smart-grid electrical transmission system.

Both the public and private sectors are involved in maintaining electricity infrastructure, although private utility companies generally provide the largest share of investment. New investments are also essential to promote the advance of renewable sources of electrical energy as an alternative to fossil fuels. According to the Energy Information Administration, 63 percent of electricity generators rely on fossil fuels—petroleum, coal, or natural gas. Renewable sources of energy currently account for only 7 percent of total energy consumption. But an overall increase in energy infrastructure investments could be the vehicle to also accelerate the use of renewable energy sources. Moreover, investments in modernizing the transmission and distributions systems—i.e. building smart grid transmission and distribution systems—would make decentralized production of power from renewable resources much more viable (Barro, 2003).

2.5 Empirical Literature

Many different researchers have attempted to describe and quantify the effects that public infrastructure has on economic output. Most of this research was sparked by Aschauer (1989) paper Is Public Expenditure Productive, which concluded that reduced government spending on public infrastructure was one of the primary causes of the economic slowdown in the U.S. He used a production function in which state output is a product of labor, productivity, utilization, private capital, and public infrastructure. He found core infrastructure (highways, mass transit, airports, electrical and gas facilities, water, and sewers) to have a profoundly positive effect on the productivity of state economies.

Munnell (2006) uses a similar methodology as Aschauer to measure the effect of public infrastructure spending on state economic output. Her study confirms Aschauer's conclusions, that spending on public infrastructure has a positive effect on the productivity of the economy, but she finds slightly lower output elasticity's of public infrastructure. Moomaw et al. (2008) expands on this technique to produce elasticity's for all 50 states for 3 years. Again, the results support a positive correlation between public infrastructure and economic output in almost all cases.

Some researchers have since challenged the statistical method used to obtain these results. Tatom (2007) argues that Aschauer's study and those using similar methodologies ignore broken trends in productivity, fail to account for changes in energy prices, and contain non-stationary variables (i.e., they fail to account for trends in the data over time). Tatom concludes that if you take into account the above limitations the effect of infrastructure stock on output is not statistically different from zero. (A statistically significant result is one that is unlikely to have occurred by

chance. Statistical significance does not imply the difference is large or important; rather, it means it is not merely random noise).

One way to address some of these concerns is to view public infrastructure as a technology that constrains the other inputs in the production function rather than as an independent input. Duggal et al. (1999) uses this approach and finds similar output elasticity's of public infrastructure as Aschauer. Bougheas et al. (2000) takes this technique one step further and views water infrastructure as a technology that reduces the cost of intermediate inputs in the production of final goods. Bougheas et al. (2000).Conclude that these reduced costs foster specialization, which increases productivity within the economy. Both these studies affirm that public infrastructure investment can expand the productive capacity of an economy, both by increasing resources and by enhancing the productivity of existing resources (Munnell, 2008).

Over time, a consensus has emerged that infrastructure stimulates economic growth; however most recent studies show that the impact is not as large as Aschauer first reported (Romp and Haan, 2005). Demetriades and Mamuneas (2000) concludes that in the long run, public infrastructure investment is positively correlated with input demands and output supply; in the short run the correlation is also positive but less powerful. This positive correlation has many possible causes. Public infrastructure is a gross-complement to both labor and private capital (Demetriades and Mamuneas, 2000).

Public infrastructure expenditures provide cost-saving benefits that exceed the associated investment costs due to substitutability between public infrastructure and private input. This is especially true in the manufacturing industry (Morrison and

Schwartz, 2009). Public spending on infrastructure also has a positive effect on the productivity of private capital investment (Munnell, 2006).

The fluctuations in the output elasticity's that have been reported by these studies have several explanations. First and foremost, the rate of return depends on the level of previous investment in infrastructure. If an economy has already made large investments in highways or water and sewer then the return on further investment will be lower than in an economy that has not spent as much developing this infrastructure (Moomaw et al., 2008). There is also a balance that needs to be struck between infrastructure and private capital. Aschauer (1989) attempts to quantify this relationship; he reports that a ratio of $0.44 of core infrastructure to $1.00 of private capital is optimal for growth in an economy (the ratio is $0.31 to $1.00 for all other infrastructure).

In an effort to overcome some of the methodological problems associated with early studies, Evans and Karras (2004) used panel data and a production function approach to estimate how government capital and services contribute to private productivity. (Panel data track cross sectional data of multiple localities over time). The authors find that educational services have positive productivity but no evidence that other services or capital (including water and sewer)are productive—the coefficient for the water and sewer infrastructure stock was not statistically significant. Using a pooled cross-section approach, Moomaw et al.,(2008) estimate the relationship between the value of assets of water and sewer infrastructure and GSP both on a national and a state-by-state basis. The results indicate that, in general, states get greater returns from investing in water and sewer systems than from investing in highways.

Heintz, Pollin and Peltier (2009) took a formal approach in their paper, by exploring a formal statistical model to see whether anticipated positive gains from public investment spending can be observed. Heintz, Pollin and Peltier found in their study that sustained increases in core public economic infrastructure in the United States enhance the growth of private sector GDP by a substantial amount. The statistic results suggested that a sustained one-percentage point increase in the growth rate of core public economic infrastructure leads to an increase in the growth rate of private sector GDP of 0.6 percentage points.

Batina (1998) examined the co-integration properties of aggregate data on output, labor, private and infrastructure and used dynamic statistical models to test for effects over time and directionality. The author found that infrastructure has a strong and long lasting effect on output and private sector variables, and vice versa. However, when infrastructure is disaggregated into real spending on highways and streets and water and sewer systems the magnitude of the infrastructure coefficients is much smaller.

Periera (2000) used VAR models to examine the relationship between aggregate and decomposed types of public investment and private GDP, investment and employment. In general, Periera found that faster growth in private GDP yields greater public investment (more tax revenue) and negative growth in employment yields greater public investment (perhaps because it is used as a countercyclical tool). However, the opposite is true for water and sewage investment. When the economy slows down, public investment goes to infrastructure like streets, mass transit, and electric—not water and sewer. When private investment grows, public investment in water and sewer grows as well. The paper also focuses on the effect on public

investment on the private sector. It found public investment has a positive effect on private output. Of the five sub-components considered (highways and streets, energy infrastructure and mass transit, water and sewer, public buildings, and conservation structures), water and sewer had the third greatest impact with respect to private GDP. It had the fourth greatest impact with respect to private employment and private investment. In all three cases, energy infrastructure and mass transit had the greatest positive impact. However, when the measures of elasticity are converted to marginal productivity (i.e., the dollar value of the increase in output) per dollar invested water and sewer has the second highest marginal productivity.

Building on the 2000 study, Periera (2001) examined the effects of different types of public investment on aggregated and disaggregated private investment. At the aggregated level, public investment in water and sewer infrastructure has lower long term elasticity's than all other types of infrastructure except for highways and streets. However, when the elasticity is converted to measure marginal productivity its impact on private investment is greater than both highways and streets, and public buildings. Like private output, the impact of public investment in energy and mass transit infrastructure yields higher returns than all other types of infrastructure.

Canning and Pedroni (1999) conducted Granger causality test between investments in three types of economic infrastructure i.e., kilometres of paved road, kilowatts of electricity generating capacity, and number of telephones based on data from a panel of 67 countries for the period 1960-1990. They found strong evidence in favour of causality running in both directions between each of the three infrastructure variables and GDP among a significant number of the countries investigated.

Fedderke and Bogeti (2006) investigate the direct impact of infrastructure investment on labour productivity and the indirect impact of infrastructure on total factor productivity using the panel data analysis method and Pooled Mean Group (PMG) estimator of Pesaran, Shin and Smith (2001) employing unrestricted error correction model. They argue that growth and productivity impacts of infrastructure have been characterized by ambiguous results with little robustness. They offer a number of explanations for the contradictory findings including possible crowding-out of private by public sector investment, non-linearity generating the possibility of infrastructure overprovision, simultaneity between infrastructure provision and growth, and the possibility of multiple (hence indirect) channels of influence between infrastructure and productivity improvements.

Herranz-Loncán (2007) analyzed the impact of infrastructure investment on Spanish economic growth between 1850 and 1935. Using new infrastructure data and VAR techniques, he shows that the growth impact of local-scope infrastructure investment was positive, but returns to investment in large nation-wide networks were not significantly different from zero. He provides two complementary explanations for the latter result. On the one hand, public intervention and the application of non-efficiency investment criteria were very intense in large network construction while on the other hand, returns to new investment in large networks might have decreased dramatically once the basic links were constructed.

Furthermore, statistical evidence for United States showed that there is a direct positive link between infrastructure investment and GDP. For instance, for the period 1950-79, growth in public infrastructure contributed almost one- for-one to economic growth. During this period infrastructure investment in core areas such as transportation, water management and electricity generation grew at an average rate

of 4% while the overall economic or GDP growth averaged 4.1% during the same period. On the other hand, during the period 1980-2007 growth in public infrastructure investment drastically fell to 2.3% while average annual GDP growth fell to 2.9 percent over the same period (Heintz et al. 2009).

A similar study was conducted in South Africa by Perkins, Fedderke and Luiz (2005). Using Pesaran, Shin and Smith's (2001) F-tests, these authors identified directions of association between economic infrastructure and economic growth. They identified long-run forcing relationships from public-sector economic infrastructure investment and fixed capital stock to gross domestic product (GDP), from roads to GDP and from GDP to a range of other types of infrastructure. They also found that the relationship between economic infrastructure and economic growth run in both directions.

In a review of the theoretical and empirical literature on the link between infrastructure investment and economic growth, Romp and Haan (2005) identify the three major approaches economists have used to estimate elasticity's. Production-function approaches an aggregated Cobb-Douglas production function is adapted to include the monetary value of the infrastructure stock. Most often infrastructure is a third factor in the production function (in addition to private capital and labor), or is incorporated into the production function as a part of the technological constraint (i.e., influences total factor productivity).The cost function for private sector firms are estimated assuming that infrastructure is externally provided by the government as a free input. When firms optimize they decide the amount of the unpaid fixed input (infrastructure) they want to use and the model satisfies the conditions of standard marginal productive theory – which the production-function approach violates. In Vector auto regression (VAR) models: All variables are jointly determined with no

apriori assumptions about causality (unlike the production function and cost-function approaches). VAR models test whether the causal relationship assumed in other approaches is valid, or whether feedback effects from output to infrastructure exist.

In Kenya, Paur (2008) did a study on water investments a case of Water Fund in Kenya. In cooperation with Swisscontact East Africa this pilot study is exploring the feasibility of developing a water fund as an innovative saving product for the microfinance sector in Kenya. The objective is to get an overview of the water sector in Kenya, to tackle possible bottlenecks and challenges in the water management and to find solutions and potential investment opportunities along the value chain of water management. Water funds are already a well-established investing and saving product in Europe. Pictet Funds S.A. and SAM Group were first to enter the market in 2001. Applying this model to a developing country as Kenya seemed to be far from reality, but research revealed the opposite. Although Africa is well known as a predominantly dry continent, Kenya has developed only a small fraction of its available fresh-water resources. Most water is abstracted from surface water, but ground water is used too. In addition to population growth, climatic variability as well as deforestation, water pollution and mismanagement are leading to water scarcity. A lot has changed in the water management of Kenya since 2002 when the new Water Act gave the impulse for the liberalization of the market. The ongoing reforms clearly define the duties for sector actors. Efficiency has been well enhanced by shifting responsibility from governmental to private ownership of water services and by the decentralization of decision making authorities. The study found that investments in water management projects accelerate economic growth as well as sustainable development, improve health and reduce poverty. The concerned parties are Swisscontact as project initiator, Equity Bank as fund manager and various companies in the water sector.

M'Amanja and Morrissey (2012) sought to identify aspects of the determinants of growth in Kenya, in particular if aid played a role. The empirical specifications used in cross-country work do not translate easily into country studies: many of the variables are not available annually or tend to change very slowly over time, and it is not feasible to include all potential determinants. Thus, we focus on one element of growth and use a multivariate approach on time series data for Kenya over the period 1964 – 2002 to investigate the growth effects of foreign aid, investment and a measure of international trade. Our econometric results reveal two long run relations representing the reduced form growth equation and the behavioral function of private investment. We find that shares of private and public investment, and imports in GDP have strong beneficial effects on per capita income in Kenya. However, aid in the form of net external loans is found to have a significant negative impact on long run growth. Private investment relates to government investment and imports negatively, but positively to foreign aid. The implication for policy is that in order for Kenya to foster and sustain growth, closer attention should be given to factors that promote private investment. Private investment appears to have a stronger influence on growth than public investment; a 10% increase in private investment leads to about 0.57% increase in output while a similar increase in government investment leads to a 0.30% increase.

2.6 Summary of Literature

From the literature, it is clear that infrastructure investment contributes to economic growth by expanding the productive capacity of a locality, region, state, or the nation as a whole. The economic impact of infrastructure is likely to depend on how additional investment is financed. However, most of the reviewed literature is from

the developed countries whose strategic approach and financial footing is different from that of Kenya. Thus, there is a literature gap on the subject matter in the Kenyan situation. This study therefore will seek to fill this gap by establishing the relationship between government investment in public infrastructure and economic growth in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter includes the various stages that were followed to complete the study. It gives the methodology for data collection, measurement and analysis. The chapter therefore comprises the following subsections: research design, data collection procedures and data analysis.

3.2 Research Design

This study adopted descriptive research design based on the key areas of interest. Descriptive research design helped the researcher to clearly identify and describe true characteristics of a research problem without manipulation of research variables (Mugenda & Mugenda, 2003). Orodho (2003) and Kothari (2004) describe a descriptive survey design as a design that seeks to portray accurately the characteristics of a particular individual, situation or a group. According to Polit and Beck, (2003), in a descriptive study, researchers observe, count, delineate, and classify. They further describe descriptive research studies as studies that have, as their main objective, the accurate portrayal of the characteristics of persons, situations, or groups, and/or the frequency with which certain phenomena occur.

3.3 Data Collection

In this study emphasis was given to secondary data which was obtained from the Government development on infrastructure obtained from the Kenya National Bureau of Statistics. The data included the government investments in infrastructure and also

economic growth data from CBK covering a period of ten years between 2005 and 2012.

3.4 Data Analysis and Presentation

The study used both descriptive and inferential statistics in analyzing the data. Analysis was done with the help of Statistical package for social scientists (SPSS version 21). It is preferred because SPSS has an ability to cover a wide range of the most common statistical and graphical data analysis and is very systematic. First, data collected was cleaned, sorted and collated. Then, data was entered into the computer, after which analysis was done. Descriptive statistics such mean score, frequencies and percentages for each variable were calculated and tabulated using frequency distribution tables. In order to test the relationship between the variables the inferential tests including the regression analysis was used.

To test for the strength of the model and the relationship between government investment in public infrastructure and economic growth, the researcher conducted an Analysis of Variance (ANOVA). On extracting the ANOVA statistics, the researcher looked at the significance value. The study was tested at 95% confidence level and 5% significant levels. If the significance number found is less than the critical value (α) set, then the conclusion was that the model was significant in explaining the relationship.

The regression equation was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

Y = Economic Growth (measured by GDP- Growth)

β_0 = Constant Term

$\beta_1, \beta_2, \beta_3$ and β_4 = Beta coefficients

X_1 = Government Investment in transportation Infrastructure

X_2 = Government Investment in Communication infrastructure

X_3 = Government Investment in water infrastructure

X_4 = Government Investment in energy infrastructure

ε = stochastic disturbance error term.

Newbery, 2012

This model is based on a similar study conducted by Bougheas et al (2000) in Canada and found that infrastructure investment is complementary to other investment in the sense that insufficient infrastructure investment constrains other investment, while excessive infrastructure investment has no added value.

# CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCSSION

4.1 Introduction

This chapter discusses the interpretation and presentation of the findings. This chapter presents analysis of the data on the relationship between government investment in infrastructure and economic growth in Kenya. The chapter also provides the major findings and results of the study.

4.2 Data Presentation

4.2.1 Transportation Infrastructure

Figure 4. 1: Government Investment in transportation Infrastructure
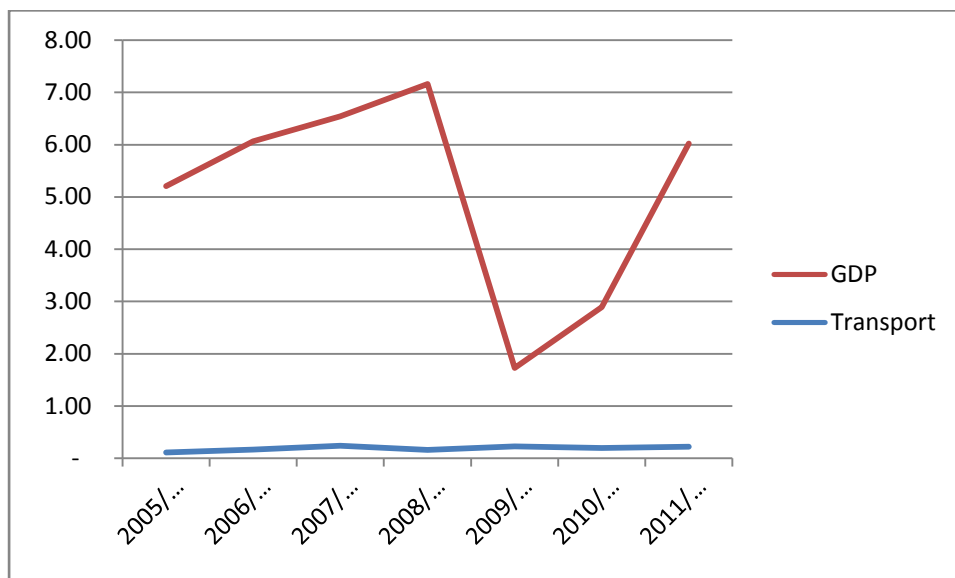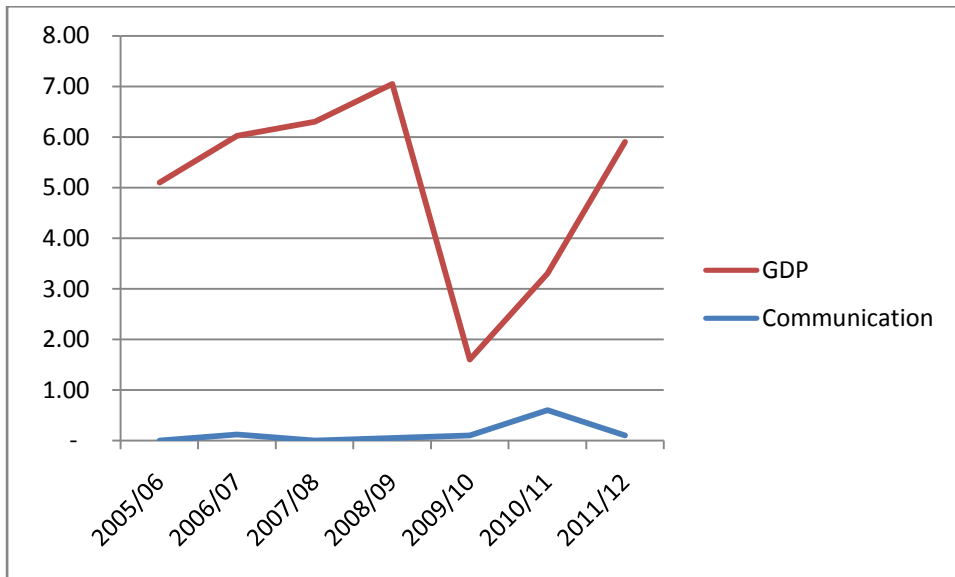

Source: Kenya National Bureau of Statistics (2013)

From the findings presented in Figure 4.1, government Investment in transportation Infrastructure development have registered a gradual increasing trend over the years with an average of 25,849.19 (proportion of 0.19) over the study period. However, the value was highest in the financial year 2010/11 (0.24) and lowest in 2005/06 (0.11).

The investment in transportation is also seen to have a positive effect on the GDP of the following financial year.

4.2.2 Communication infrastructure

Figure 4. 2: Government Investment in Communication infrastructure

Source: Kenya National Bureau of Statistics (2013)

The findings on government investment in communication infrastructure are shown in Figure 4.2 above. According to the data findings, the government investment in communication infrastructure showed a general fluctuating trend over the year and reached a spike in 2009/10. The findings also show that government investment in communication infrastructure have a direct effect on GDP such that an increase in government investment in communication infrastructure leads to higher GDP.

4.2.3 Water Infrastructure

Figure4. 3: Government Investment in Water Infrastructure
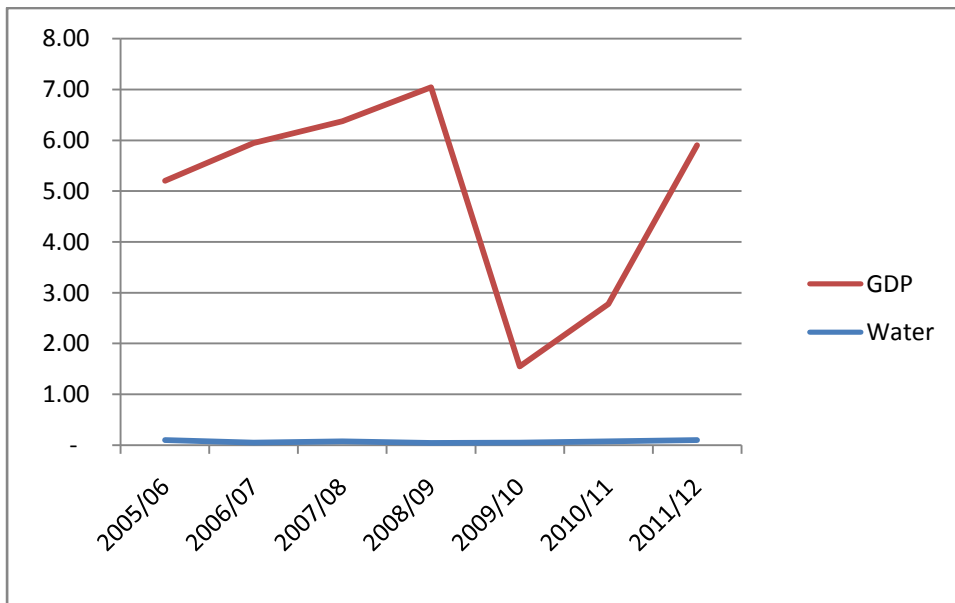
Source: Kenya National Bureau of Statistics (2013)

The study also sought to establish the level of government investment in water infrastructure. From the findings in Figure 4.3 above, government investment in water infrastructure showed a gradual increase apart from 2006/07 when it also recorded the lowest value of 3,317millions(proportion of 0.08) with an average of 9,67 millions (proportion of 0.07). The findings also show that government investment in wter infrastructure results in economic growth of the material year.

4.2.4 Energy Infrastructure

Figure 4.4: Government Investment in Energy Infrastructure
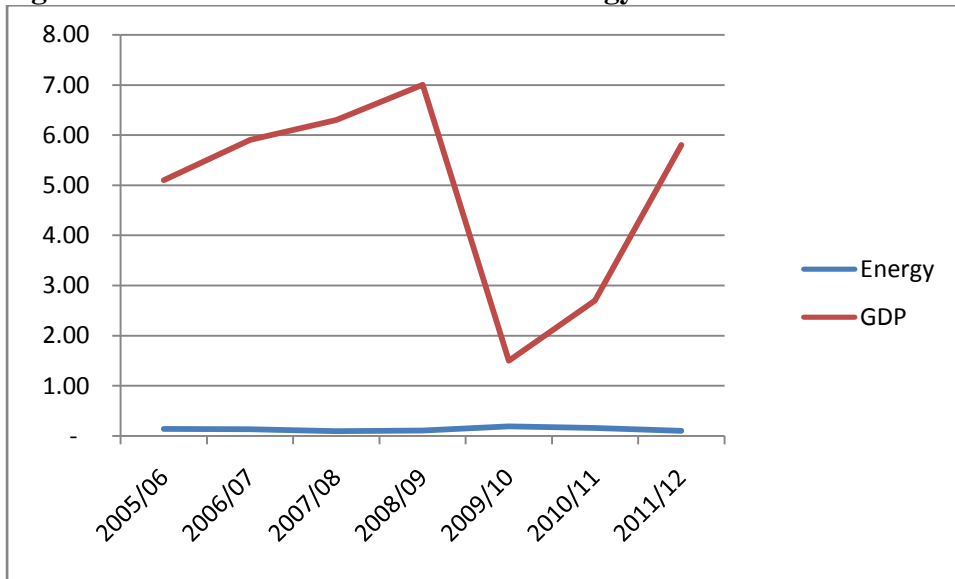
Source: Kenya National Bureau of Statistics (2013)

Results on the level of government investment in energy infrastructure show a general fluctuating trend over the study period with the highest value being recorded in 2009/010 (proportion of 0.19). The figure also shows that government investment in energy infrastructure have an effect on the economic growth of the following years.

4.2.5 GDP Growth Rates

Figure 4. 5: GDP Growth Rates
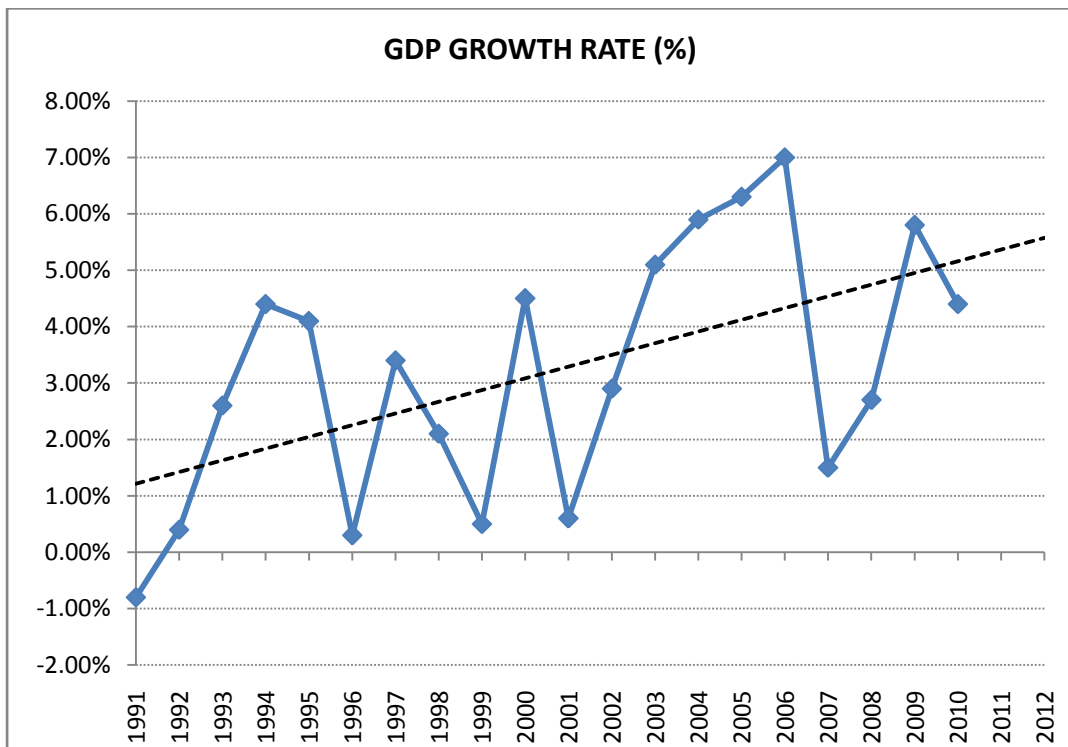
Source: Kenya National Bureau of Statistics (2013)

Figure 4.6 shows the annual rates of GDP growth in Kenya since 1991 to 2010. The average rate of growth for 20 years was 3.19%. The highest level of economic growth was in 2006 when a rate of 7.00% was realized. The lowest rate for the period was -0.80% in 1991. The bold dotted trend line indicates that generally Kenya's GDP growth rate has been on the upward trend.

4.3 Correlation Analysis

Table 4.1: Correlation Matrix

		Economic Growth	Transportation Infrastructure	Communication infrastructure	Water infrastructure	Energy infrastructure
Economic Growth	Pearson Correlation	1				
	Sig. (2-tailed)	.				
Transportation Infrastructure	Pearson Correlation	.768	1			
	Sig. (2-tailed)	.029	.			
Communication infrastructure	Pearson Correlation	.569	.423	1		
	Sig. (2-tailed)	.017	.016	.		
Water infrastructure	Pearson Correlation	.622	.343	.297	1	
	Sig. (2-tailed)	.031	.012	.028	.	
Energy infrastructure	Pearson Correlation	.684	.303	.120	.231	1
	Sig. (2-tailed)	.047	.009	.002	.014	.

The data presented before on government investment in transportation infrastructure, government investment in communication infrastructure, government investment in water infrastructure and government investment in energy infrastructure were computed into single variables per factor by obtaining the averages of each factor. Pearson's correlations analysis was then conducted at 95% confidence interval and 5% confidence level 2-tailed. The table above indicates the correlation matrix between the factors (government investment in transportation infrastructure, government investment in communication infrastructure, government investment in water infrastructure and government investment in energy infrastructure) and

economic growth. According to the table, there is a positive relationship between economic growth and government investment in transportation infrastructure, government investment in communication infrastructure, government investment in water infrastructure and government investment in energy infrastructure of magnitude 0.768, 0.569, 0.622 and 0.684 respectively. The positive relationship indicates that there is a correlation between the factors and the Economic Growth. This infers that government investment in transport infrastructure has the highest effect on economic growth, followed by government investment in energy infrastructure, then government investment in water infrastructure while Government Investment in communication infrastructure having the lowest effect on the economic growth in Kenya. All the variables were significant (p-value <0.05).

The Pearson correlation also indicates that there is no significant correlation between the independent variables themselves. That is, none of the correlation coefficients are greater than 0.5 hence no problem of multicollinearity. This means that all the four predictor variables could be used in the multiple regression analysis.

4.4 Regression Analysis

In this study, a multiple regression analysis was conducted to test the influence among predictor variables. The research used statistical package for social sciences (SPSS V 21.0) to code, enter and compute the measurements of the multiple regressions

Table 4.2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.954[a]	.909	.788	.92189

Source: Author (2013)

R-Squared is a commonly used statistic to evaluate model fit. R-square is 1 minus the ratio of residual variability. The adjusted R^2, also called the coefficient of multiple determinations, is the percent of the variance in the dependent explained uniquely or jointly by the independent variables. 78.8% of the changes in the economic growth in Kenya could be attributed to the combined effect of the predictor variables.

Table 4.3: Summary of One-Way ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.570	4	6.393	9.522	.015
	Residual	2.550	3	.850		
	Total	28.120	7			

Source: Author (2013)

The probability value of 0.023 indicates that the regression relationship was highly significant in predicting how transportation infrastructure, communication infrastructure, water infrastructure and energy infrastructure affected the economic growth in Kenya. The F calculated at 5% level of significance was 9.522. Since F calculated is greater than the F critical (value = 9.1172), this shows that the overall model was significant.

Table 4. 4: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	6.669	2.954		2.257	.0109
Transportation Infrastructure	10.562	8.193	.230	1.289	.0288
Communication infrastructure	5.623	1.997	.642	3.317	.0145
Water infrastructure	7.272	15.799	.665	3.625	.0236
Energy infrastructure	8.617	13.363	.128	.645	.0215

Source: Author (2013)

As per the SPSS generated table above, the equation ($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$) becomes:

$Y = 6.669 + 10.562 X_1 + 5.623 X_2 + 7.272 X_3 + 8.617 X_4$

The regression equation above has established that taking all factors into account (transportation infrastructure, communication infrastructure, water infrastructure and energy infrastructure) constant at zero, economic growth in Kenya will be 6.669. The findings presented also show that taking all other independent variables at zero, a unit increase in investment in transportation infrastructure would lead to a 10.562 increase in the scores of economic growth in Kenya and a unit increase in the scores of investment in communication infrastructure would lead to a 5.623 increase in the scores of economic growth in Kenya. Further, the findings shows that a unit increases

in the scores of government investment in water infrastructure would lead to a 7.272 increase in the scores of economic growth in Kenya while a unit increases in the scores of government investment in energy infrastructure would lead to a8.617 increase in the scores of economic growth in Kenya.

Overall, transportation infrastructure had the greatest effect on the economic growth in Kenya, followed by energy infrastructure then water infrastructure while communication infrastructure had the least effect to the economic growth in Kenya. All the variables were significant (p<0.05).

4.5 Summary and Discussion of Findings

The study sought to establish the relationship between government investment in infrastructure and economic growth in Kenya. The study found that government investment in infrastructure had a great effect on the country's economic growth as shown by the adjusted R Square which shows that 78.8% of the changes in the economic growth in Kenya could be attributed to the combined effect of the predictor variables. This means that economic growth in Kenya is very sensitive to the level of government investment in infrastructure development. This confirms the thesis of Grey and Sadoff (2007) and the findings from previous studies by Herranz-Loncan (2007) on Spain, Fedderke, Perkins, and Luiz (2006) on South Africa, Pereira and Andraz (2005) on Portugal, and Groote et al (1999) on the Netherlands that investments (either in water sector or in all sectors) have positive impact on economic development. Munnell (2008) also indicated public infrastructure investment can also contribute to economic growth through the expenditures associate with purchasing, installing, operating, and maintaining the infrastructure itself.

The coefficient of transportation infrastructure on economic growth was 10.562 which was significant (P = 0.0288). This indicated that there was a strong positive and significant relationship between transportation infrastructure on economic growth in Kenya. It indicated that economic growth in Kenya is affected by the levels of government investment in transportation infrastructure. These results are in consistent with those found by Munnell (2008) who observed that infrastructure investment contributes to economic growth by expanding the productive capacity of a locality, region, state, or the nation as a whole. A new highway, for example, allows for increased transportation of people, goods, and services. But it does more. It creates opportunities for increased commerce as businesses will locate near the new road, providing additional jobs and output. Barro (2003) also observed that public Transport is afforded high priority in the Programme for Government. This is due to the contribution that an attractive public transport system can make not only to economic renewal and to the climate change agenda but importantly also to the citizen's daily lives. Investment in public transport facilitates alternatives to car transport, helping to reduce congestion and emissions and enabling the transport sector to cater for the demands associated with longer term population and employment growth in a sustainable manner

The coefficient of communication infrastructure was 5.623 which was significant (P = 0.0145). The findings show that government investment in communication infrastructure was positively significantly related to economic growth in Kenya. Higher investments in communication infrastructure result into greater the changes in economic growth in Kenya. The results are in agreement with the findings by Young (2005) who deduced that the widespread availability of advanced broadband infrastructure and services is essential to realizing future growth potential in existing

and emerging sectors. It will also play a key role in supporting the growth of small businesses, capturing opportunities for productivity and innovation, supporting regional development, enabling greater public sector efficiency and marketing Ireland as a location for ICT-intensive FDI and R&D projects.

The coefficient of water infrastructure and economic growth in Kenya was 7.272 which was statistically significant (P = 0.0236). These results indicate that water infrastructure is a significant determinant of economic growth in the country for the period of study. These findings are in agreement with those of Romp and Haan (2005) who indicated that water is the lifeblood of the economy - a medium essential for all life and livelihoods, as a key raw material for economic sectors and a binding constraint on their future growth.

The coefficient of energy infrastructure was 8.617 which was significant (p = 0.0215). The results indicate that there was a positive and significant relationship between changes in investment in energy infrastructure and changes in economic growth. The findings of this study agree with the findings of EIA (2009) that without infrastructure improvements, increased energy demands will generate sizeable economic and environmental challenges. Natural gas currently represents the second most important source of energy for Kenya after petroleum. As part of a green energy transformation, we may not want to invest this heavily in the natural gas industry. However, any reduction in natural gas infrastructure will need to be at least matched by further investments in renewable energy and a smart-grid electrical transmission system.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter is organized into five parts; the summary of findings, conclusions of the study, recommendations for policy and practice and suggestions for further research.

5.2 Summary of findings

The Kenyan public infrastructure has deteriorated badly after the past generation of neglect. With no doubt, the result of declining and insufficient investments has been a worsening infrastructure deficit and mounting investment needs. This study sought to investigate the relationship between government investment in infrastructure and economic growth in Kenya. This study adopted a descriptive research design. In this study emphasis was given to secondary data which was obtained from the Government budget allocations to the infrastructure obtained from the Kenya National Bureau of Statistics. The data included the government investments in infrastructure and also economic growth data from CBK covering a period of ten years between 2005 and 2012. In order to test the relationship between the variables the inferential tests including the regression analysis was used.

The study found from the descriptive statistics that the investment in transportation is also seen to have a positive effect on the GDP of the following financial year. The findings also show that government investment in communication infrastructure have a direct effect on GDP such that an increase in government investment in communication infrastructure leads to higher GDP. The findings further show that government investment in wter infrastructure results in economic growth of the

material year. It was clear that government investment in energy infrastructure have an effect on the economic growth of the following years.

From the correlation analysis, the study deduced that there is a strong, positive and significant relationship between economic growth and government investment in transportation infrastructure, communication infrastructure, water infrastructure and in energy infrastructure of magnitude 0.768, 0.569, 0.622 and 0.684 respectively. The positive relationship indicates that there is a correlation between the factors and the economic growth. This infers that government investment in transport infrastructure has the highest effect on economic growth, followed by government investment in energy infrastructure, then government investment in water infrastructure while government investment in communication infrastructure having the lowest effect on the economic growth in Kenya.

The regression findings revealed that 78.8% of the changes in the economic growth in Kenya could be attributed to the combined effect of the predictor variables. Taking all other independent variables at zero, a unit increase in investment in transportation infrastructure would lead to a 10.562 increase in the scores of economic growth in Kenya and a unit increase in the scores of investment in communication infrastructure would lead to a 5.623 increase in the scores of economic growth in Kenya. Further, the findings shows that a unit increases in the scores of government investment in water infrastructure would lead to a 7.272 increase in the scores of economic growth in Kenya while a unit increases in the scores of government investment in energy infrastructure would lead to a8.617 increase in the scores of economic growth in Kenya.

From the study findings and discussion, the study concludes that government investment in infrastructure development had a positive and significant affect economic growth in Kenya for the period of this study. The study recommends that adequate funding should be directed towards infrastructure projects preparation, implementation and maintenance. The study suggests that proper reform policy should be complemented with the availability of necessary infrastructures that are important for the economic development in the country. There should be established Initiative focusing on the political championing and sponsoring of specific infrastructure projects with potential impact on economic integration. Emphasis should also be given on developing public-private partnerships (PPPs) and encourage increased joint-venture project development between multinational firms and local enterprises for infrastructure development.

5.3 Conclusions

The relationship between the economy and infrastructure is evidently critical to promoting inclusive growth and sustainable development. Infrastructure investment is one of the main preconditions for enabling developing countries to accelerate or sustain the pace of their development and achieve the Millennium Development Goals (MDGs) set by the United Nations in 2000. From the study findings and discussion, the study concludes that government investment in infrastructure development affect the level of economic growth in Kenya. The conclusion is that government investment in infrastructure development had a positive and significant affect economic growth in Kenya for the period of this study. Infrastructure development supports various kinds of economic activity, including as an input into production and also raises the marginal product of other capital used in the production process.

The study also concluded that government investment in transportation infrastructure had the greatest effect on the economic growth in Kenya, followed by energy infrastructure then water infrastructure while communication infrastructure had the least effect to the economic growth in Kenya. This finding is a strong argument to encourage the governments to spend more of their annual budgets on the transportation sector.

5.4 Recommendations for Policy and Practice

Since it was clear that government investment in infrastructure development affect the level of economic growth in Kenya, the study recommends that adequate funding should be directed towards infrastructure projects preparation, implementation and maintenance. It is also necessary to sustain the recent trend of increasing investment in infrastructure. Relevant agencies should monitor the progress of priority projects; coordinate and resolve issues arising during permitting and environmental review; and develop best practices for expediting these decisions that may be instituted on a wider scale, consistent with applicable law

The study suggests that proper reform policy should be complemented with the availability of necessary infrastructures that are important for the economic development in the country. Global experiences with reforms of government infrastructure have already established the major parameters of the policy changes required to secure greater private sector participation. The government should establish a clear strategy for the reform of the sector, based on structuring profitable investments opportunities. Regulations should be refocused on providing an enabling environment that serves to contain risk.

There should be established Initiative focusing on the political championing and sponsoring of specific infrastructure projects with potential impact on economic integration. This high level initiative should focus on sponsoring catalytic infrastructure projects, through political leadership and championing. Significantly, this would provide a much needed platform to mobilize domestic and foreign resources for development impact

Emphasis should also be given on developing public-private partnerships (PPPs) and encourage increased joint-venture project development between multinational firms and local enterprises for infrastructure development. The leaders should be motivated by the common desire to promote a Kenyan-led and owned development agenda, pursued a value-driven partnership premised on selected sector priorities with infrastructure as a core target. The leaders should act as champions which will bring visibility to the infrastructure projects, facilitate the unblocking of bottlenecks and any political impasse, provide leadership in resource mobilization for the projects, and subsequently, the champions will support and ensure speedy project implementation, and through a progress reporting mechanism. Further, there should be an effective and inclusive partnership with the international community including the private sector which will support the country's commitment in this regard and help realize the desired impact.

5.5 Limitations of the Study

The short time span of the data used in this research posed serious drawbacks in drawing clear cut conclusion from the results since it limits the number of lags that can be used. Another limitation of the data is that since most public investments are based on long-term contracts with single or limited number of investors, the country

will see the same amount of investments being invested every year, and when such investments are included in regression to explain GDP which has more variation over the years, then no correlation will be found.

Another challenge is limited data availability and the uncertain quality of the data used. Despite the fact that infrastructure is one of the most important factors for economic development of a nation, reliable data of water and all infrastructure related activities is very hard to find in all selected variables.

The quality of the data may be a weakness of this study. It is not possible to tell from this research whether the results are simply due to the nature and quality of data used or whether it is the true picture of the situation. Actually the use of the data from the various sources like the economic survey is based on the assumption that the data are accurately captured.

5.6 Suggestions for Further Research

For further studies, it will be interesting to investigate the effect of private sector investment in infrastructure development on the level of economic growth in Kenya since the private developers operate from a different strategic and financial footing from the government. Also, comparing the effect of government and private sector investment in infrastructure development on the level of economic growth in Kenya could be another line of study that would be interesting to engage in.

This study focused on the empirical historical data only. Economic growth is also affected by non empirical factors within the countries where the investment is to be done. There is need to complement the findings of this research using a qualitative

approach to find out the current behavioral issues affecting infrastructural investment and therefore economic growth such as leadership and governance.

Another study should also look on the effect of social infrastructure development especially the human resource on economic development. This is because the physical infrastructure can only enhance the economic growth if there exists a sustainable social infrastructure.

REFERENCES

Aghion, T. and Howitt, S. (1992). *Introductory econometrics for finance, Second edition*. New York: Cambridge.

Aschauer, D. A. (1989). Is Public Expenditure Productive? *Journal of Monetary Economics* 23 : 177-200.

Batina, R.G. (1998). On the long run effects of public capital and disaggregated public capital on aggregate output. *International Tax and Public Finance*, 5:3: 263-281.

Bigman, D. (2002). *Globalization and the Developing Countries: Emerging Strategies for Rural Development and Poverty Alleviation*. CABI.136.ISBN 978-0-85199-575-5.

Bougheas, S., Panicos, O., Demetriades, W. and Theofanis P. M. (2000). Infrastructure, Specialization, and Economic Growth. *The Canadian Journal of Economics* 33 no. 2: 506-522.

Canning, D. and Pedroni, P. (1999). Infrastructure and Long Run Economic Growth, *Discussion Paper No 57,* Boston: Harvard Institute for International Development, Consulting Assistance on Economic Reform.

CBI, Confederation of British Industry (2012a).*Budget 2012 Analysis,* March.

CBO (Congressional Budget Office).(2007). *Trends in Public Spending on Transportation and Water Infrastructure, 1956 to 2004*.Congress of the United States, Congressional Budget Office.

Census Bureau. (2008). *State and Local Government Finances by Level of Government and by State: 2005-06*. Annual Survey of State and Local Government Finances. <http://www.census.gov/govs/estimate/0600ussl_1.html>. Accessed: June 2008.

Chan, C., Forwood, D., H. Roper, and C. Sayers (2009).*Public Infrastructure Financing: An International Perspective,* Productivity Commission Staff Working Paper.

Clark, G. (2007). *A Farewell to Alms: A Brief Economic History of the World.* Princeton University Press.ISBN 978-0-691-12135-2.

Cooke, G. and Kothari, P. (2001).*Principles of Corporate Finance*; 7th Edition; Tat McGraw-Hill.

Crafts, N. (2009). Transport Infrastructure in Investment: Implications for Growth and Productivity, *Oxford Review of Economic Policy* 25(3): 327-343. 41

Dacin, A. (1997). Public Capital and Economic Growth. *The Annals of Regional Science* 34: 343-363.

Daffin, C. and Hobbs, D. (2011).*Comparison of Public Sector Finance Measures from the National Accounts and Whole of Government Accounts*, National Audit Office.

Deephouse, K. (1996). Coping with contradictions in business process re-engineering. *Information Technology & People*, 9(4), 40.

Demetriades, P. O. and Mamuneas, T. P. (2000).Inter temporal Output and Employment Effects of Public Infrastructure Capital: Evidence from 12 OECD Economies. *The Economic Journal* 110 no. 465:687-712.

Dudley, S. (1969). Economic Growth and Capital Accumulation, *Economic Record*, 32, pp. 334–61.

Duggal, V. G., Saltzman, C. and Lawrence R. K. (1999). Infrastructure and Productivity: A Nonlinear Approach. *Journal of Econometrics* 92: 47-74.

Economic Planning Advisory Commission (1995). Public infrastructure funding in Australia

Eddington Review (2006). *The Eddington Transport Study: The Case for Action – Sir Rod Eddington's Advice to Government*, December.

EIA (Energy Information Administration).(2009). *Annual Energy Outlook 2008.* Washington, DC.

Environmental Protection Agency. (2005). *Drinking Water Infrastructure Needs Survey and Assessment:* Third Report to Congress. United States Environmental Protection Agency..

Environmental Protection Agency. (2008). *EPA Reports on Clean Water Infrastructure Needs.* EPA Newsroom.

Evans, P. and Karras, G. (2004). Are Government Activities Productive? Evidence from a panel of US States *Journal of Monetary Economics* 23 : 177-200.

Fedderke, J. and Bogeti Z. (2006).*Infrastructure and Growth in South Africa*: Direct and Indirect Productivity Impacts of 19 Infrastructure Measures, World Bank Policy Research Working Paper 3989, August 2006.

Gakubia, T., Pokorski, D. and Onyango, T. (1996).*Up scaling Access to Sustainable Sanitation* – Kenya, January 2010

Gramlich, E. M. (2004). Infrastructure Investment: A Review Essay. *Journal of Economic Literature* 3: 1176–1196.

Gramlich, S. (2004). Water and economic development: the role of variability and a framework for resilience. *Natural Resource Forum* 30: 306-317.

Hall, T. (1983).A Contribution to the Theory of Economic Growth, *Quarterly Journal of Economics*, 70(1), p p. 65-94.

Heintz, J., Pollin, R., and Garrett-Peltier, H. (2009). *How infrastructure investments support the US economy: employment, productivity and growth*, Political Economy Research Institute. January, Available at: http://www.americanmanufacturing.org/wordpress/wp-content/uploads/2009/01/peri_aam_finaljan16_new.pdf. Accessed on March 25, 2010.

Heintz, James, and Robert Pollin and Heidi Garrette-Peltier. (2009). *How Infrastructure Investments Support the U.S. Economy*: Employment, Productivity and Growth‖.

Herranz-Loncán, A. (2007). Infrastructure investment and Spanish economic growth, 1850–1935, *Explorations in Economic History*, Vol.44, No. 3, July, pp. 452-468

Hirschmann, B. (1958). *A New Economic View of American History*. New York: W.W. Norton and Co. ISBN 0-393-96315-2

Jomo, D. &Reinert, Z. (2005).*Mass Production, the Stock Market Crash and the Great Depression*. New York, Lincoln, Shanghi: Authors Choice Press.

Kemp, R. L. (2005). America on the Road to Ruin? *Public Works Management & Policy* 10 no. 1: 77-82.

Kenya Society of Civil Engineers (KSCE). (2011). *Failure To Act*: The Economic Impact of Current Investment Trends in Surface Transportation Infrastructure‖<http://www.asce.org/Infrastructure/Report-Card/Economic-Study/>.

Kimenyi, J.M. Mbaku, and N. Mwaniki (2009).*Restarting and Sustaining Economic Growth and Development in Africa: the Case of Kenya*, Ashgate.

Knetter, U. (1989). Knowledge, finance and human capital: The role of social institutional variables on entrepreneurship in japan. *Industry and Innovation*, 11(4), 373.

Kothari, C. R. (2004). *Research Methodology: Methods and Techniques.* New Delhi: New Age International Publishers.

Lepartobiko W. (2012).*Factors That Influence Success In Large Construction Projects: The Case Of Kenya Urban Roads Authority Projects*. Unpublished Master Of Arts In Project Planning And Management project, University Of Nairobi.

Lepenies, D. (2008). Infrastructural Investment in Long-run Economic Growth: South Africa 1875 – 2001. *World Development* 34: 1037 – 1059.

Levine, G. (2000). *Organizations*: A Quantum View, Prentice Hall, Englewood Cliffs, NJ., .

Lyambilah, I. B. (2012).*Factors Affecting Brand Positioning In The Bottled Water Industry: A Case Study Of Nairobi Bottlers Limited*. Unpublished MBA project, University of Nairobi.

M'Amanja, D., Lloyd, T. and Morrissey, O. (2005).*Fiscal Aggregates, Aid and Growth in Kenya:* A Vector Autoregressive (VAR) Analysis, School of Economics, University of Nottingham: CREDIT Research Paper 05/07.

Martinsons, D. (2008). Why has Africa grown slowly? *The Journal of Economic Perspective* 13: 3-22.

Martinsons, G. (1998). Water and economic development: the role of variability and a framework for resilience. *Natural Resource Forum* 30: 306-317.

Moomaw, R. L., Mullen, J. K. and Williams, M. (2008).The Interregional Impact of Infrastructure Capital.*Southern Economic Journal.*61 (3): 830-845.

Morrison, C. J., and Schwartz, A. E. (2009). Public Infrastructure, Private Input Demand, and Economic Performance in New England Manufacturing *Journal of Business and Economic Statistics* 14 (1): 91-101.

Mugenda, M., O., &Mugenda, G., A. (2003). *Research Methods.* Nairobi: Acts Press.

Munnell, A. (2008). How Does Public Infrastructure Affect Regional Economic Performance. *New England Economic Review*. Federal Reserve Bank of Boston: 11-32.

Munnell, A. H. (2006). Policy Watch: Infrastructure Investment and Economic Growth. *The Journal of Economic Perspectives* 6 (4): 189-198.

Newbery, D. (2012). *Energy and Infrastructure*, Submission to the LSE Growth Commission.

Njaggah, D. and Odiambo, H. (2010). Performance of the phase II Dandora waste stabilisation ponds: The case for anaerobic ponds, *Water Science and Technology* Volume 33, (7): 91–98.

OECD (2003).*The Sources of Growth in OECD Countries*

OECD(2006).Investment in the United Kingdom).*Journal on Budgeting* 6 no. 4.

Orodho, C. (2003). *Research Methods in the social sciences.* London: Arnold.

Paur, A. (2008). *Water Investments.* Pilot Study for a Water Fund in Kenya. Winterthur.

Periera, M. (2000).Infrastructure and economic development in the Netherlands (1853-1913).*European Review on Economic History* 3, 233 – 251.

Periera, M. (2001).Public and private investment in the Netherlands. *Economic Modelling.* 19: 641 – 664.

Perkins , P., Fedderke, J. and Luiz, J. (2005). An Analysis of Economic Infrastructure Investment in South Africa, *South African Journal of Economics*, Vol. 73 (2): 211-228.

Pesaran, H.M., Shin, Y. and Smith, R.J. (2001). Bounds testing approach to the analysis of long-run relationships, *Journal of Applied Econometrics, 16, 289-326*

Polit, A. and Beck, R. (2003). *The practise of social research (10th Ed).* Thomson Belmont CA: Wadsworth Publishing Company.

Powell, B. and DiMaggio, S. (1991). *The Political Economy of Economic Growth in Africa*, 1960 – 2000. New York: Cambridge.

Republic of Kenya (2009). *Economic Survey*, Government Printer, Nairobi.

Rimberia E. K. (2012). *Determinants Of Sustainability Of Water Projects In Kieni East Division, Nyeri County*. Unpublished MA project, University of Nairobi.

Romer, T. (1990).Endogenous Growth Theory. Theoretical perspectives in recent empirical research.*ACM Computing Surveys*, 12(1): 61-110.

Romp, W. and Haan, J. (2005). Public Capital and Economic Growth: A Critical Survey. *European Investment Bank Papers* 10.no. 1: 6–52.

Ryan, T.C.I. (2012).*Policy Timeline and Time Series Data for Kenya: An Analytical Data Compendium,* Kenya Institute for Public Policy Research and Analysis, Special Report No. 3, Nairobi.

Sang, A. K. (2012). *The effect of electricity interruption on micro business enterprises in Nairobi CBD*. Unpublished PhD thesis, Jomo Kenyatta University Of Agriculture And Technology

Scott, W. R. (2004). *Institutional theory*. Encyclopedia of Social Theory, George Ritzer, ed. Thousand Oaks, CA: Sage.

Sen, C. (1988). *Recent Economic Changes and Their Effect on Production and Distribution of Wealth and Well-Being of Society*. New York: D. Appleton and Co. ISBN 0543724743.

Smil, V. (2004).*Enriching the Earth: Fritz Haber, Carl Bosch, and the Transformation of World Food Production*.MIT Press. ISBN 0-262-69313-5.

Stewart, J. (2010).*The UK National Infrastructure Plan 2010*, European Investment Bank Papers: Public and Private Financing of Infrastructure.

Suchman, V. (1995). The nature of common pool resources. *Rationality and Society,* 2: 335-358.

Tatom, J. A. (2007). Public Capital and Private Sector Performance. *Federal Reserve Bank of St. Louis*: 3-15.

Todaro, C. (1989). *Productivity Trends in the United States*. Princeton University Press for NBER: 111.

UNCTAD (2008).*World Investment Report 2008: Transnational Corporations and the Infrastructure Challenge: Overview*. New York and Geneva: United Nations.

Wambua, S. (2004).*Water Privatization in Kenya*, Global Issue Paper, Heinrich Böll Foundation, (8): 12-15.

World Economic Forum (2010).*Global Competitiveness Report 2010 -11*.

Young, R.A. (2005). Economics of water resources: a survey. *In* A.V. Kneese and J.L. Sweeney, eds. *Handbook of natural resources and energy economics,* Vol. II.Amsterdam, Elsevier Science Publishers.

APPENDICES

Appendix I: Raw data

YEAR	Transport development expenditure	Water development expenditure	Communication development expenditure	Fuel &Energy development expenditure	Total Development Expenditure
	Kshs "Millions"	Kshs "Millions"	Kshs "Millions"	Kshs "Millions"	Kshs "Millions"
2005/06	4,252.09	4,231.45	-	5,751.04	40,140.95
2006/07	10,229.55	3,317.12	76.54	8,397.56	62,381.91
2007/08	20,448.43	6,598.72	-	8,471.92	85,831.11
2008/09	25,689.46	7,592.01	77.91	17,904.42	162,896.33
2009/10	36,718.16	8,414.30	162.70	30,872.76	160,712.99
2010/11	35,609.88	15,290.60	1,118.72	29,551.59	185,529.80
2011/12	47,996.73	22,265.90	218.73	22,897.31	216,113.29