

**IMPACT OF INFRASTRUCTURE DEVELOPMENT ON ECONOMIC
COMPETITIVENESS IN KENYA**

BY

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of Degree of Master of Arts in Economics of the University of Nairobi, Kenya.**

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DECLARATION

The research paper is my original work and has not been submitted to any other institution of higher learning.

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DEDICATION

I dedicate this work to my wife, parents and siblings for their immense support during my studies.

ACKNOWLEDGEMENTS

My profound appreciation goes to my supervisor Mr. Raphael Kabando for useful guidance during the research period.

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ABBREVIATIONS AND ACRONYMS

ACRONYM	DESCRIPTION
ARC	Africa Competitiveness Report
AfDB	African Development Bank
AIDI	African Infrastructure Development Index
ASALs	Arid and Semi-Arid Areas
CSP	Country Strategy Paper
EAC	East Africa Community
ERS	Economic Recovery Strategy for Wealth and Employment Creation
GDP	Gross Domestic Product
GoK	Government of Kenya
ICT	Information Communication Technology
IFC	International Finance Corporation
MIPs	Mega Infrastructure Projects
MTPs	Medium Term Plans
NARC	National Rainbow Coalition
NZSIF	New Zealand Social Infrastructure Fund
OECD	Organisation of Economic Cooperation and Development
RMLF	Road Maintenance Levy Fund
SGR	Standard Gauge Railway
STI	Science, Technology and Innovation
WEF	World Economic Forum
WASREB	Water Services and Regulatory Board

ABSTRACT

The main aim of this paper is to investigate how infrastructure development impacts on economic competitiveness of Kenya, taking into account selected lower middle income countries. This study was motivated by two main factors. First, the Kenya Economic Blueprint - the Vision 2030 identifies infrastructure development among the key drivers towards achieving shared prosperity in Kenya by 2030. Secondly, understanding the impact of infrastructure development on the economy can go a long way into enhancing proper forward looking policy.

Most of the empirical work in Kenya focussing on infrastructure development are limited to certain geographical jurisdiction and specific sectors. This paper therefore sought to include four sectors of infrastructure to determine how they conduce to economic competitiveness of Kenya.

A variant form of Isaack Newton's gravity model is applied using panel data running from 2000 to 2013. A Hausmann test suggested that fixed effects frame work was preferred to random effects model. The results indicated that transport and energy infrastructure to be positive and significant in driving economic competitiveness of Kenya while ICT and Water and Sanitation were found to be insignificant. Further, GDP and labour force which were considered as control variables were found to be imperative in determining economic competitiveness of Kenya.

1 CHAPTER ONE: INTRODUCTION

Introduction

This chapter outlines the background, research problem, objectives, research questions, significance of the study and the in the last section it provides a layout of how this study will be organised.

1.1. Background of the Study

1.1.1 Competitiveness of a nation

Several suggestions have been made on the meaning for the term ‘Competitiveness of a nation’. First, the World Economic Forum (hereafter WEF) 2011 defined competitiveness of a nation as the set of institutions, strategies, and aspects that determine productivity levels of any country. Conversely, the productivity level defines sustainable prosperity of such a nation. Secondly, the business dictionary defines competitiveness as the ‘ability of a firm or a nation to offer products and services that meet the quality standards of the local and world markets at prices that are competitive and provide adequate returns on the resources employed or consumed in producing them.’

Other definitions are based on particular economic sectors. For instance, the United Nations Industrial Development (2013) explains competitiveness as the ability of a country to proliferate its presence in international and domestic markets at the same time developing the industrial segments of the economy. Similarly, OECD 2012 viewed competitiveness as the concept for analysing macroeconomic performance of a country while Buckley et al (1988) introduced three issues namely; performance in terms of total sales through exports, potential of parent and affiliate companies and processes of management of both affiliate and parent companies which must be considered when determining competitiveness.

So, what measures competitiveness? Given the various definitions of competitiveness, various measures have been coined to measure it. The major difference among various approaches is the number of factors that are used to measure competitiveness. One school of thought uses single-factor measures while the other uses multiple-factors. Seminal work available exploring use of single-factor measures include; Buckley P.J., Pass C.L., and Prescott K. (1986) who found that the commonly used single measures of competitiveness include: export growth, export market share, balance of trade, percentage of manufacturing to

total output and profitability. On the other hand, multiple factors measures have gained popularity in the last two decades (WEF, 2008). The factors which include qualitative measures have been used to construct indices such as Global Competitiveness Indices, Global Tourism Competitiveness Indices and Global Industrial Competitiveness Indices among others.

For purposes of this study, we adopt definition of WEF (2011) which equates competitiveness with the policies, features and institutions in place to determine the country's productivity. In this regard, policies and/or strategies of the government such as investment in infrastructural development will be viewed as deliberate efforts to encourage domestic production and promote sales of quality domestic goods in international markets. Therefore, this study will adopt a single measure of Kenya's productivity, that is, volume of export because higher volume and better quality of domestic goods are achieved with sound infrastructure development (WEF, 2012 and AfDB, 2014).

1.1.2 Trends of Kenya's Competitiveness

Kenya is the largest economy in East Africa and her potential is seen as a regional hub for trade (AfDB, 2014). The following economic indicators illustrate this position:

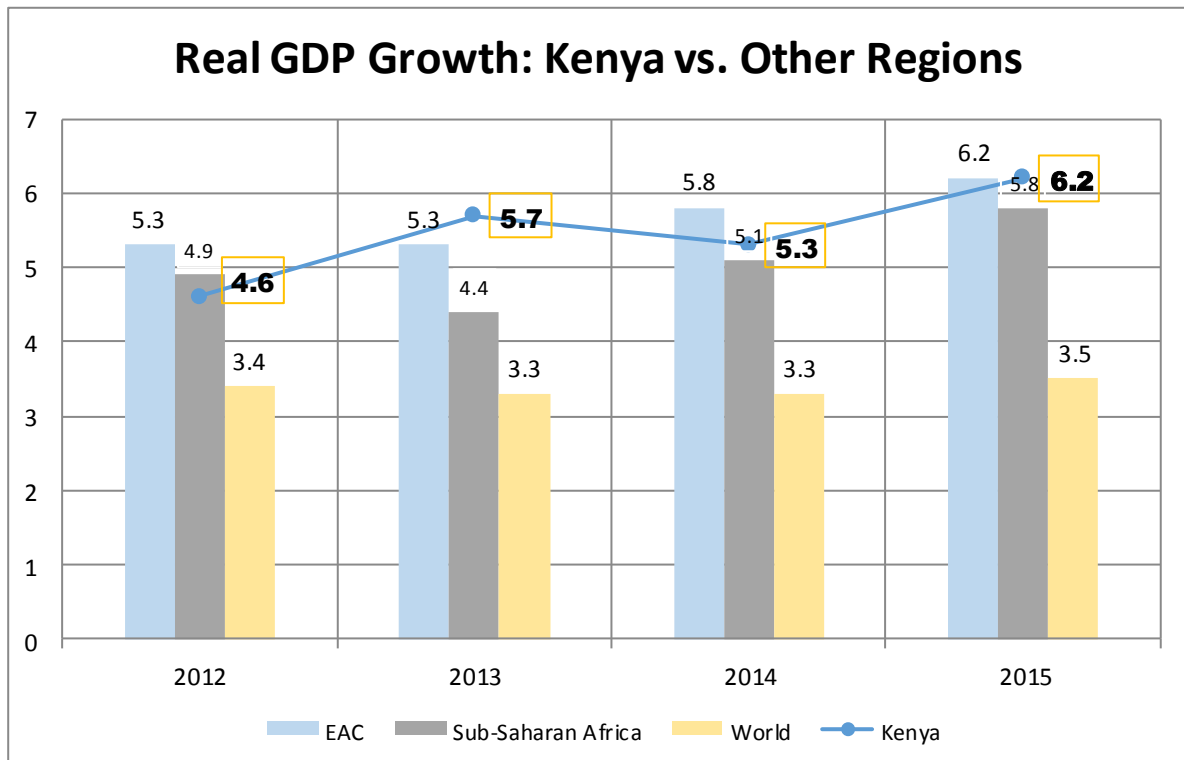
Table 1.1: Selected economic indicators in Kenya

Indicator	2012	2013	2014	2015
Real GDP Growth (%)	4.6	5.7	5.3	6.2
GDP Per Capita Growth (%)	1.8	2.9	2.6	2.9
Export Growth (%)	-0.2	0.5	5.3	-0.9
Imports Growth (%)	5.4	-0.8	10.6	-1.2

Source: Author compilation using Data from KNBS Economic Survey (2015) and World Bank

The growth in real GDP has been relatively steady as compared to other region which imply increased ability produce more and improvement of factors that facilitate trade of a country. Similarly, GDP per capita is now a unit higher in 2015 than it was in 2012 indicating improved share of income per individual in the country and hence better ability to produce more. Further, Kenya's growth in real GDP has consistently over stripped global and Sub-Saharan average growth and had moved at par with the East African average.

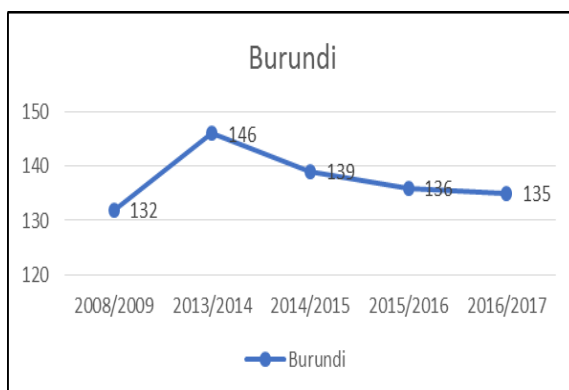
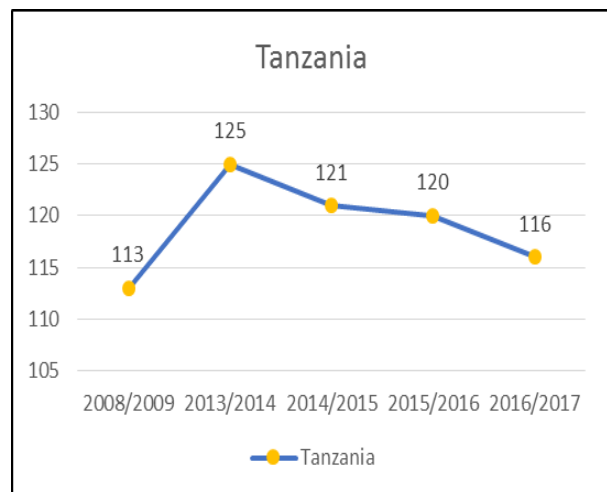
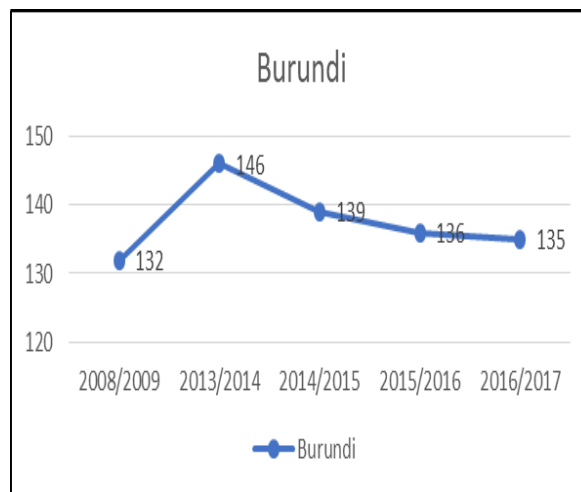
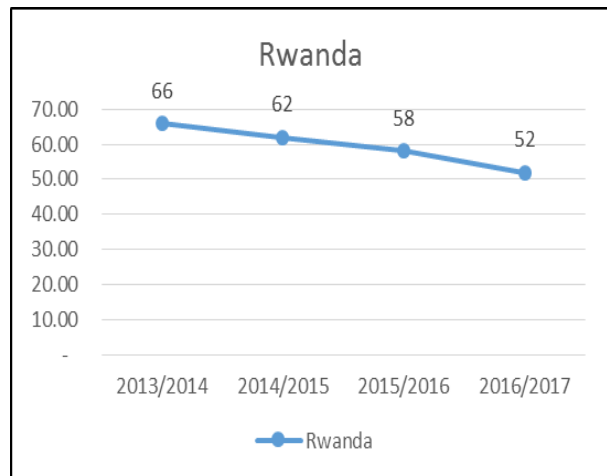
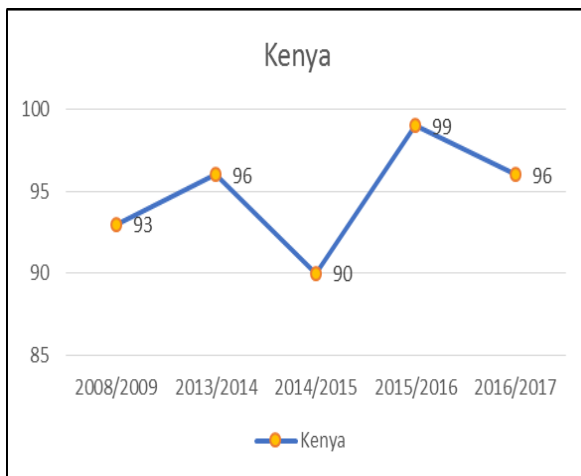
Figure 1.1: Comparison between Kenya and other regions in Real GDP growth terms



Source: Author Analysis using KNBS 2016 and World Bank Data

In addition, the performance of Kenya vis-à-vis other countries as indicated by overall global ratings depicts an economy that is increasingly becoming competitive (CSP, 2014 - 2018). Even though, trends by EAC states depict improving competitiveness globally, Kenya is considered the economic power in the region which underscores her potential for more productivity (AfDB, 2014 & IFC, 2011).

Figure 1.2: Trends in Global Competitiveness Indices in Kenya and rest of EAC



Source: Author Analysis using Global Competitive Indices Data by WEF (2008/2009 to 2016/2017)

Kenya's ratings worsened in 2015/2016 but still stood out among the rest of EAC member and maintained position two away from Rwanda implying a consistent competitive inclination.

Despite the promising future for Kenya, a number of challenges continue to hinder her improvement in economic prosperity. According to the AfDB Country Strategy Paper for 2014 to 2018, poor infrastructure, high prevalence of communicable diseases and security threats. Similarly, the ACR (2015) noted that insufficient supply of infrastructure in Kenya is among the key factors holding back the country's competitiveness.

1.1.3 Definition of Infrastructure development

The term infrastructure has been defined differently by various authors and reports. First, some seminal work that focussed on infrastructure include the World Development Report (1994), which acknowledged that there is no unique definition as it encompasses various activities with related technical and economic features like benefit spill overs from both consumers and non-consumers. The report however notes about 'economic infrastructure' which it defines to include public utilities (such as telecommunications), public works (such as roads and dam works) and other transport sectors (such as airports and water transport). Among the earliest scholars who wrote about infrastructure is Ascheur (1988) who did not give any particular definition but focussed on "core infrastructure" which he argued it included streets, highways, airports, water systems, sewers among others.

In the recent past, Alberto et al (2010) defined infrastructure to include two major categories, that is, hard and soft infrastructure¹. A similar classification is adopted by Kingombe (2014) in his paper where he explores hard and soft infrastructure in Africa². The paper adds that soft infrastructure also include institutions that aid in trade facilitation.

¹ Alberto et al (2010) equated hard infrastructure to physical infrastructure whereas soft infrastructure consist of business and regulatory environment. The World Bank page with details of this classification can be accessed through this URL <http://go.worldbank.org/U2SOPB4AK0>

² The paper was presented in a 'Multi-year Expert Meeting on Transport, Trade Logistics and Trade Facilitation Second Session' at Geneva.

A varied classification of infrastructure in the developed countries such as New Zealand and Australia is done by NZSIF³. NZSIF notes that infrastructure is a broad term and can be put in two major classes namely Economic and Social infrastructure and are differentiated by the commercial nature of the investment in infrastructure in question. In this regard, economic infrastructure supports economic activities and is characterised by user-pays or demand based revenue streams while Social Infrastructure refers to the amenities planned to provide social services which are commonly offered by public enterprises such as schools, car parking and water services.

For purposes of this study, the term infrastructure will be defined to include four key sectors irrespective of their classification. These include transport, Information Communication Technology (ICT), Water and Sewerage and Energy infrastructure. The selection is based on the emphasis these sectors are given in the Kenya Vision 2030 – a roadmap that explores the country's desired economic situation by 2030.

1.1.4 Role of Infrastructure Development on economic competitiveness

Infrastructure development plays a fundamental part in economic growth and development. In this regard, the sectoral contribution to economic growth and development cannot be overemphasised. Some of the seminal work includes World Development Report (1994) which attempted to establish the link between infrastructure and development shows that indeed infrastructure is a core component for economic development to be achieved. While many researchers generally agree that development of infrastructure is necessary for growth, Estache and Garsous (2012) assert that the ranking of subsectors in terms of which is more important to growth is difficult due to the different levels of investment allocated to various sectors in different regions.

Empirical work by Ghosh et al (1998), Mbekeani (2007) and Deng (2013) universally agree that infrastructure development is critical to enhancing market accessibility and expansion especially in developing countries. Trade facilitation, enhanced interaction of buyers and sellers as well as creation of new markets are results of effective market access. Many countries especially mature economies (such as the USA) realised economic take-off due to trade (Mbekeani, 2007). Trade brings market players on the same table hence leading to

³ NZSIF is an abbreviation for New Zealand Social Infrastructure Fund Limited which invests in Social Infrastructure in New Zealand and Australia.

establishment of networks, exchange of lessons from different economies and brings about competition which ensures efficient market allocations. To leverage on the benefits of effective market access, there must be a well-functioning infrastructure system including good transport network and effective communication.

The interdependence of various economies for mutual benefits is a new frontier that developing economies such as Kenya are relying on to grow their economies. In this regard, regional integration and formation of economic blocs has been a priority factor for many governments. Infrastructure development is one of the key determinants to effective integration of these economies. For instance, four countries including; Kenya, Uganda, Rwanda and South Sudan governments have committed to increase capacity and provide less costly rail transport through construction of a Standard gauge railway whose first phase is under implementation.

Among the key sectors of infrastructure is information communication technology (simply put ICT). The sector hosts a crucial function for business growth - communication. In the modern word, technology has reduced the vast global landmass into a village. Real time communication, ease of accessing information and forward looking technology has made communication easy for businesses. This implies that prospective investors can readily access information they need to invest in any economy and trading is being done in real time. With the growing youthful population especially in Africa, e-commerce, mobile-based business and business process outsourcing have become important considerations by governments.

Infrastructure development especially the mega infrastructure projects (MIPs) create come alongside rich social benefits package (Railway Corporation of Kenya, 2015 and GoK, 2013). For instance, the standard gauge railway creates at least 60 direct new jobs per kilometre during the construction period. On the other hand, SGR is estimated to create many indirect jobs including: 10,000 jobs in local industries and 3,000 jobs in service and hospitality industries. Other benefits as envisaged by Railway Corporation of Kenya (2015) include: at least 15000 people will be trained on skills that will enable them create self-employment.

1.1.5 Infrastructure development in Kenya

Infrastructure development in the Sub-Saharan African Countries had been an area of tremendous focus by most governments (AfDB, 2011). Among the key infrastructure with huge deficit include energy, transportation and ICT. This has not only constrained domestic

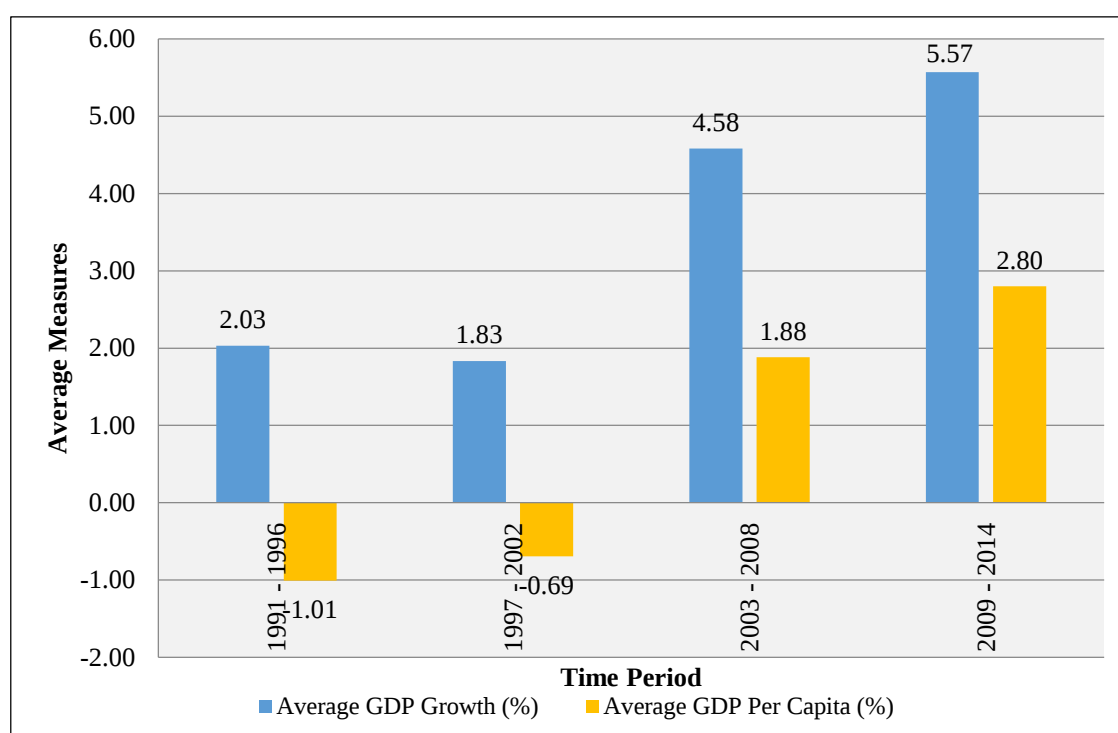
productivity but it has poses an enormous challenge to the success of regional integration that various countries in African Countries are seeking to harness (Africa Competitiveness Report 2013).

In Kenya, a number of attempts have been made to develop policies on infrastructure development and governance. For instance, the Sessional Paper No. 10 of 1965, which focused on application of African socialism and its application to planning in Kenya, laid a foundation for government strategic objectives for national development. The paper recognised that developing power, transport, market facilities and other infrastructure would not only turn Kenya into a market economy but also will fuel rapid industrialisation. On infrastructure governance, the Sessional Paper No. 12 of 1967 outlined that some functions such as water distributions and road passenger transport ⁴ could not be effectively handled by local governments due to capacity and resources constraints. As such the paper noted that such functions could only be pegged on a local governments' ability to generate sufficient revenues.

Despite the efforts made by various policy initiatives to develop proper infrastructure, economic growth remained low sluggish during the 1990s and early 2000s when compared from 2003 onwards. For instance, for over a decade the average per capita growth in GDP was negative as compared to the period starting from 2003 to-date.

⁴ More details can be obtained in page 6 of the Sessional Paper No 12 of 1967.

Figure 1.3: Average growth in GDP and GDP Per Capita between 1991 and 2013



Source: Author analysis using World Bank Data

Kenya's turnaround in growth agenda was realised with the election to power of the National Rainbow Coalition (NARC) government in 2003. The NARC Government led by the former president Mwai Kibaki through the Ministry of Planning and National Development (MoPND) committed to reverse this two-decade period of sluggish economic growth. In this regard, Economic Recovery Strategy (ERS) for Wealth and Employment Creation (2003 - 2007) was rolled out and whose major aim was to give Kenyans a better deal of life in the struggle to build a modern and prosperous nation. ERS identified poor state of infrastructure development as a major impediment to economic and social development especially in Arid and Semi-Arid Areas (ASALs). The ERS further identified Water and Sanitation and Information and Communication Technology (ICT)⁵ respectively as some of the crucial cross-cutting issues that fuel other sectors to growth.

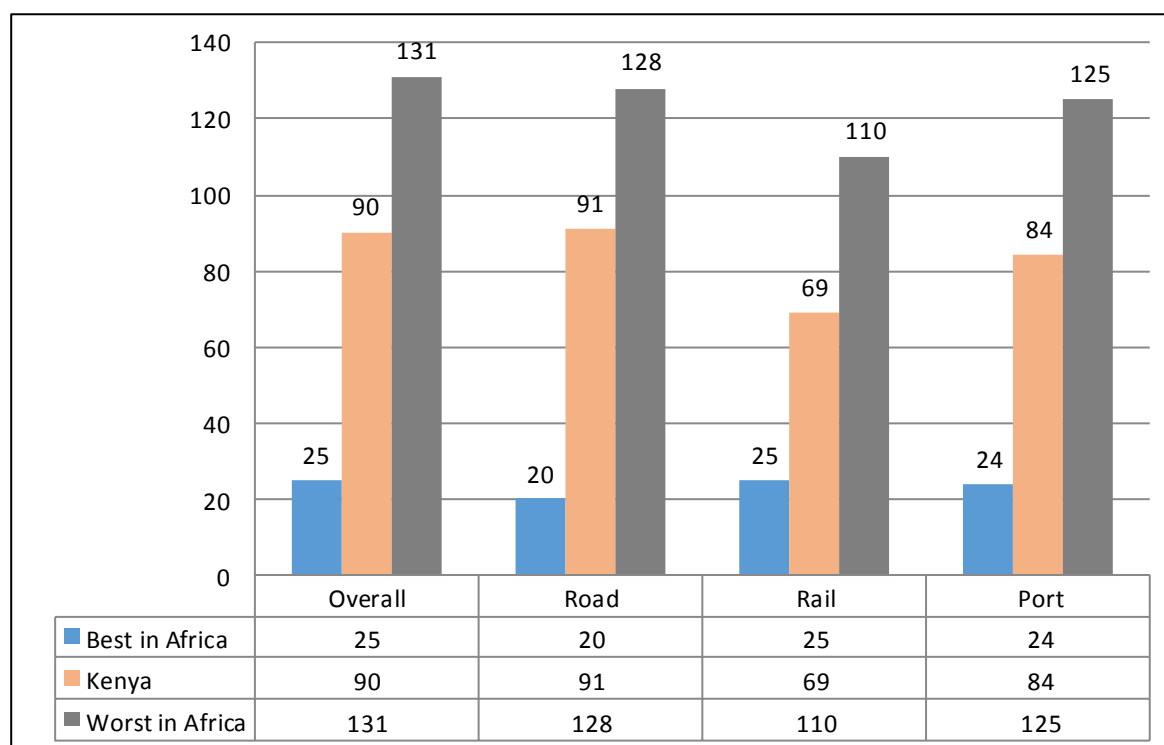
The success of ERS by 2007 had moved economic growth from as low as 0.6% in 2002 to 6.1% 2006. It is in the auspices of this remarkable improvement that Vision 2030 aimed at building 'a globally competitive and prosperous nation with high quality of life by 2030.' The

⁵ For more details, reference is made to sections 8.10, 9.5 and 9.6 of the ERS.

vision based on three key pillars (i.e. Economic, Social and Political) supported by ten foundations. Among these foundations we have; first, *Infrastructure*, where the Vision 2030 aspires for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities and telecommunications. Secondly, *Energy* where the Vision recommends projects that would increase demand on Kenya's energy supply and generate more energy at lower cost. Other foundations include Science, Technology & Innovation (STI) as well as Security – both which are intended to employ ICT to boost economic productivity or efficiency and in crime detection and prevention respectively.

The Vision 2030 was set to be implemented in five-year medium term plans (MTPs). Under the first MTP I, significant progress was made. For instance, according to the Kenya Economic Survey 2013, real GDP grew from 2.1% in 2008/2009 to 5.4% in 2012/2013 while development spending increased from 7.2 % of the total GDP in 2008/2009 to 11.8% of the total GDP in 2012/2013. However, in spite of the rise in development spending and increased share of the national budget that goes to infrastructure the supply remain low in Kenya (AfDB 2011).

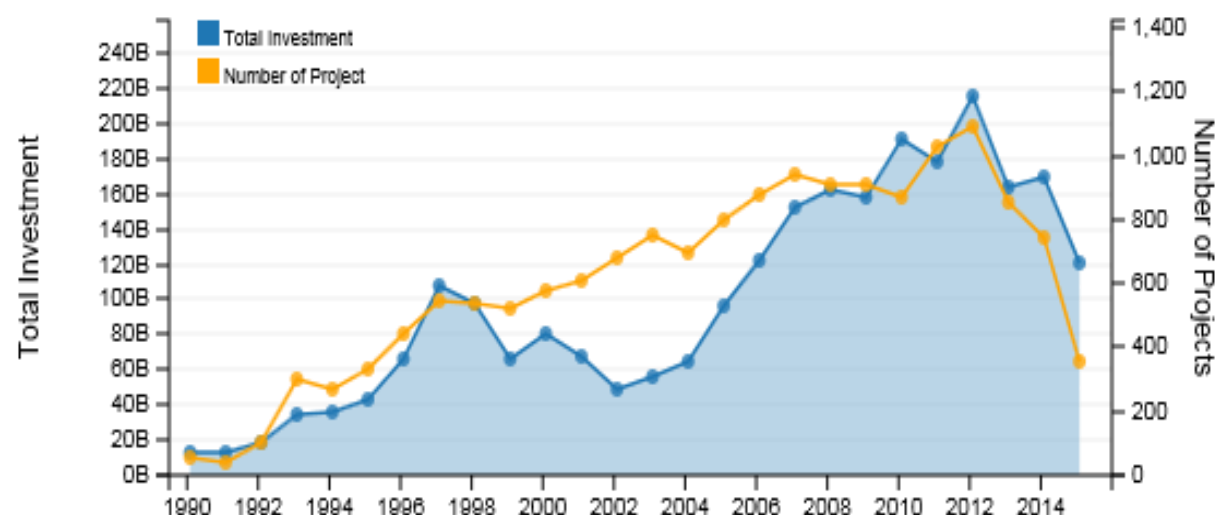
Figure 1.4: Africa Infrastructure Index Ranking for 2011



Source: Adapted from AfDB Country Strategy Paper 2014 - 2015

Even though the supply of infrastructure has historically remained low, the government has heightened investment to a tune of 27% of the total budget (CSP, 2014 – 2018) and the number of projects started for infrastructure development especially on transport, energy, water & sanitation and environment related drastically increased (World Bank, 2016).

Figure 1.5: Kenya Infrastructure – total investment and number of projects



Source: Adapted from World Bank's PPI Database

Several observation can be made from the above trends. First, there has been increase in investment in infrastructure especially in transport, energy, water & sanitation and ICT in the recent past. Secondly, the vision 2030 MTPs emphasise on higher investment in infrastructure. Thirdly, Kenya's competitiveness ranking has generally improved. This presents an exciting scenario for research to establish the nexus between infrastructure development and competitiveness in the economy.

1.1.6 Structure of sectors covered in the study

1.1.6.1 Structure and performance of the Transportation Sector

The ERS (2003-2007) among other things acknowledged that the deprived nature of the physical infrastructure such as roads and rails play holds back productivity of the economy. In fact, the African Infrastructure Development Index (AIDI)⁶ developed by the African

⁶ The Africa Infrastructure Development Index (AIDI) was first published in 2011 and it focusses on four components, namely: Transport, Electricity, ICT and Water & Sanitation. The four components are subdivided

Development Bank in 2011 with the aim of monitoring the progress and status of infrastructural developments in Africa ranks transport among the four sectors constituting the index.

The Kenya Policy Blueprint envisages that by 2030 there will be no region in the country that will be worth the term ‘remote’. The vision therefore prioritises development of transport network in the country as part of the structural reforms noted in Section 2.3 of MTP II. Proper and efficient transport sector can be credited to enhancing domestic and regional trade, opening up markets and improving accessibility to the remote areas.

This sector is headed by the Cabinet Secretary for the Ministry of Transport and Infrastructure. Under the ministry, there are several parastatals which work to ensure that various subsectors under the ministry are functioning properly.

Table 1.2: Institutions in the Transport Sector

Institution	Legal Instrument	Role in Transport Sector
Kenya Roads Board (KRB)	KRB Act 1999 and 2007	Administer funds Road Maintenance Levy Fund (RMLF) and any other funds that may accrue to it
Kenya National Highways Authority	Kenya Roads Act, 2007	Management, development, rehabilitation and maintenance of national roads.
Kenya Urban Roads Authority	Kenya Roads Act, 2007	Development, rehabilitation, maintenance and management of urban roads.
Kenya Rural Roads of Highways and Building Technology	Kenya Roads Act, 2007	Development, rehabilitation, maintenance and management of rural roads.
Kenya Railways Corporation (KRC)	KRC Amendment Act, 2005	Management of railways
Kenya Railways Training School	KRC Amendment Act, 2005	Building capacity on transport and logistics
Kenya Ports Authority (KPA)	KPA Act	Maintenance, operating, improving and regulating all scheduled sea ports situated along Kenya’s coastline
Kenya Airports	KAA Act, 1991	Managing airports in Kenya

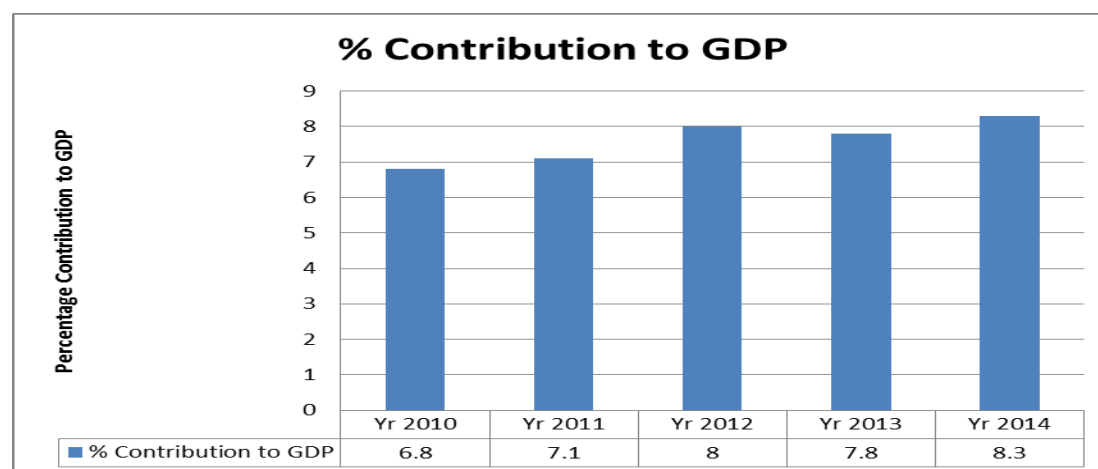
into 9 indicators, which have either a direct or an indirect impact on economic productivity, namely: total paved roads in km per 10,000 inhabitants; total road network in km per km² of exploitable land area; Net generation of electricity in KWh per inhabitant; total phone subscriptions per 100 inhabitants; Fixed-line telephone subscriptions as % of population; Mobile-cellular subscriptions as % of population; No of internet users per 100 inhabitants; Fixed broadband internet subscribers per 100 inhabitants; international internet band width (mbps); improved water source (% of population with access) and improved sanitation facilities (% of population with access).

Institution	Legal Instrument	Role in Transport Sector
Authority (KAA)		
Kenya Ferry Services	Cap 466	Ferrying people and vehicles across the Likoni channel connecting the mainland and the Mombasa island
Kenya National Shipping Line	Cap 466	Providing shipping services
East African School of Aviation	KCAA (Amendment) ACT, 2002	Building capacity in civil aviation
Kenya Maritime Authority (KMA)	KMA Act, 2006	Providing regulatory oversight over the Kenyan maritime industry
Bandari College	KPA Act	Building capacity of the Maritime industry
Kenya Civil Aviation Authority (KCAA)	KCAA (Amendment) ACT, 2002	Regulation and oversight of the civil aviation industry
Transport Licensing Board	Transport Licensing Act (Cap 404)	Licencing Public Service Vehicles
National Transport and Safety Authority	NTSA Act (2012)	Harmonising operations of the key road transport departments and help in effectively managing the road transport sub-sector and minimizing loss of lives through road accidents.
LAPSSET Corridor Development Authority	Gazette Notice of April 01, 2013	Management of LAPSSET project

Source: Author compilation using information from the Ministry of Transport and Infrastructure

In the 2014/2015 financial year, the transport Sector grew by 5% from 1.2% in 2013/2014.

Figure 1.6: Contribution of Transport to GDP

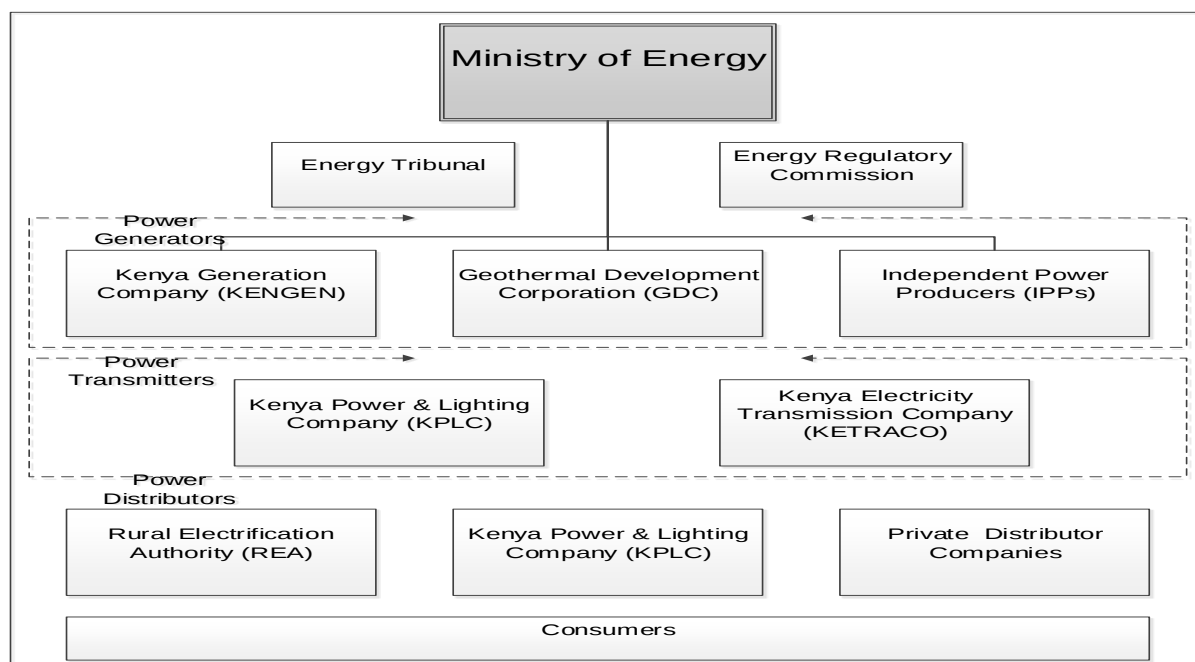


Source: Author analysis using Kenya Economic Survey (2015) data

1.1.6.2 Structure and performance of the Energy Sector

The energy sector institutional structure is organised in a way that distribute various functions coherently. The Ministry of Energy and Petroleum develops policy for the entire sector whereas the rest of the functions.

Figure 1.7: Energy Sector Players



Source: Ministry of Energy and Petroleum

Table 1.3: Functions of institutions in the Energy Sector

Institution	Role in Energy Sector
Energy regulatory commission (ERC)	Reviewing tariffs and enforcing safety and environmental regulations in the power sector
Energy Tribunal	Arbitration of disputes between the ERC and the aggrieved stakeholders in the energy sector
Kenya Electricity Generating Company	Generation of electricity which it sells to Kenya Power
Geothermal Development Company (GDC)	Development of geothermal electric power
Independent Power Producers (IPPs)	Build, own and operate power stations and sell power in bulk to KPLC
Kenya Electricity Transmission Company (KETRACO)	Responsible for electricity transmission

Kenya Power and Lighting Company	Planning for sufficient electricity generation and transmission capacity to meet demand; building and maintaining the power distribution and transmission network and retailing of electricity to its customers.
Rural Electrification Authority	Accelerating the pace of rural electrification in the country
National Oil Corporation of Kenya	Involved in all aspects of the petroleum supply chain covering the upstream oil and gas exploration, midstream petroleum infrastructure development and downstream marketing of petroleum products.
Kenya Nuclear Electricity Board	To fast track the development of nuclear electricity generation in Kenya.

Source: Author compilation using information from Ministry of Energy and Petroleum

The Vision 2030 and the MTP II identified that energy costs in Kenya are comparatively higher than those of other countries. This translates to higher costs of doing business and hence diminished competitiveness of our Economy. It is on this basis that the ministry operates with the aim of reducing the cost of power by at least 40% in electricity and increase production to a tune of at least 5000 Mega Watts by 2017. This in line with the MTP II which among other measures aimed at increasing access to electricity through upgrading and expansion of the national power transmission and distribution network to improve supply and reliability, reduce losses and connect two million new customers by 2017. The Rural Electrification Authority (REA) is also supposed to continually implement the Rural Electrification Programme (REP) targeting to connect 6304 public facilities by 2017. The government also targeted to develop new and renewable sources of Energy as alternative sources of energy. Constraints in the Energy sector are among the two major factors that are attributed to low productivity in Kenya. The productivity gap faced by Kenya firms is estimated to around 30% of the total productivity – where they have to bear enormous costs trying to bridge the infrastructure gap (African Competitiveness Survey, 2013). The contribution to GDP of this sector is rather stagnant at 1% considering the available data on electricity supply for a five-year period.

1.1.6.3 Structure and performance of the ICT Sector

For Kenya to recover from two decades of slow economic growth, ERS singled out ICT as one of the major cross-cutting issues that needed urgent attention in order to regain efficiency in government processes. The Vision 2030' economic pillar distinctively classifies an ICT-

led sector – Business Process Offshoring (BPO) as one of the critical drivers for attaining the ambitious two-digit growth on average. Kenya made significant progress in the global arena where she led in the electronic cash transfer through mobile telephony, commonly known as *Mpesa*. In addition, by the end of 2012, 60% of the planned development of improving connectivity to ICT services was achieved; all major towns are connected through National Optic Fibre Backbone Infrastructure (NOFBI); and demand for internet subscription increased from 1,579,387 in 2009 to 8,506,748 in 2012 indicating an increase in demand of over 400%. The achievement were made on the backdrop of low ICT skills, inadequate human capacity for research and development of ICT, a sharp digital divide between rural and urban areas among others.

The MTP II therefore aimed to fast track the challenges encountered under MTP I with an overarching overall goal to strengthen the foundation of a knowledge based economy. As such the Ministry of Information Communication and Technology was formed under the Executive Order No. 2/2013 of the Jubilee Government. Some of the key mandates bestowed upon the ministry were: ICT Policy, promotion of E-government, ICT agency, Dissemination of public information among others. As it is the case with other ministries, various parastatals or boards are hosted by the ministry to help in executing various functions which include; ICT Authority, Communication Commission of Kenya, Konza Technopolis Development Authority, Brand Kenya Board, Kenya Broadcasting Corporation etc.

Table 1.4: Institutions in the ICT Sector

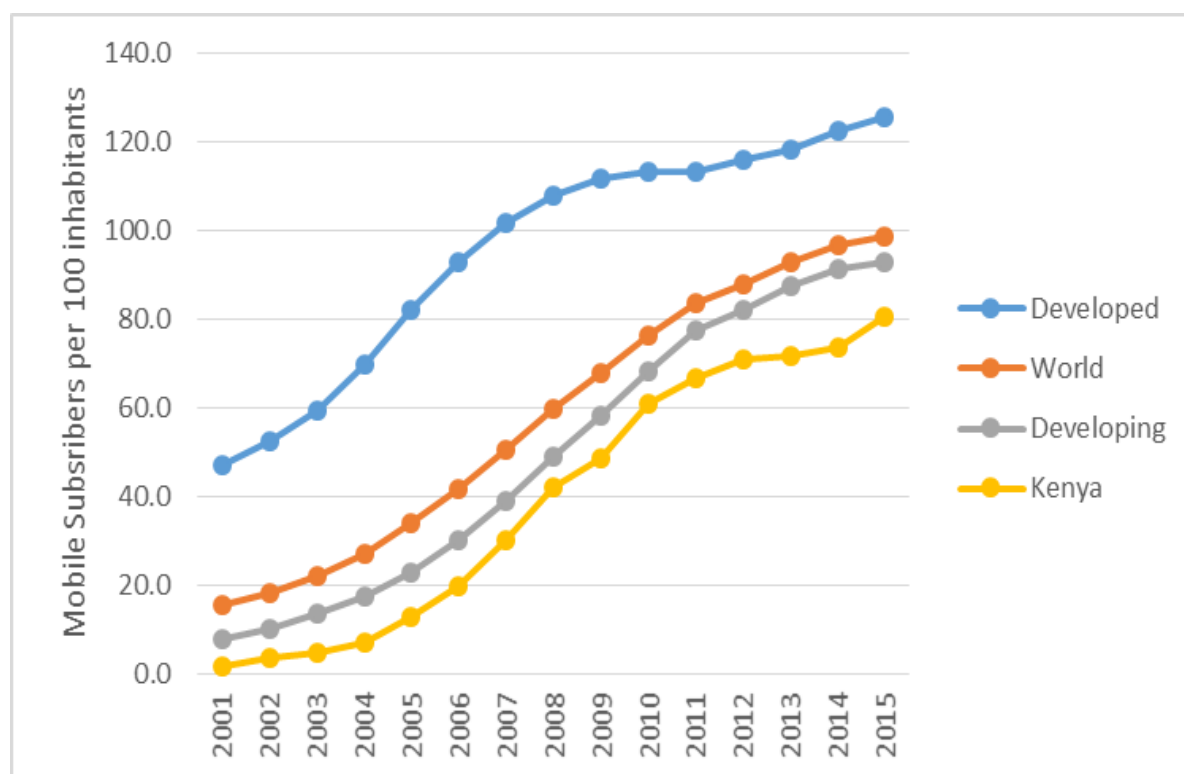
Institution	Legal Instrument	Role in ICT Sector
Kenya Broadcasting Corporation	Act of Parliament, Cap 221 of the Laws of Kenya	To undertake public broadcasting services.
Communication Authority of Kenya	Communications Amendment Act (2013)	To regulate telecommunications, postal and radio communication services
Postal Corporation of Kenya	Postal Corporation of Kenya Act (1998)	To provide communications, distribution and financial services
ICT Authority	State Corporations Act Cap 446	Develop and position Kenya as the preferred ICT destination in Africa
Media Council of	Media Act 2007	Leading institution in the regulation of media,

Kenya		conduct and discipline of journalists
Kenya Year Book Editorial Board	Legal Notice No. 187 of 2nd November, 2007	Compile, edit and publish the Kenya Yearbook detailing the work of the Government of Kenya in partnership with the people
Multimedia Appeal Tribunal	Communication Amendment Act (2013)	Arbitrating disputes between parties in the communications sector
National Communications Secretariat	Communications Act (1998)	Advising on policies, carrying out specialized research and conducting continuous review of development under the info-communications sector
Konza Technopolis Development Authority	Legal Notice No. 23 of 5th April, 2012	To coordinate the planning and development of the SMART City
Kenya Institute of Mass Communications	Legal notice 197 of 2011	To develop talent pool for the sector

Source: Author compilation using information from Ministry of ICT and Government Agencies under it

The sector has indicated consistent double-digit growth as evidenced by the recorded growth by 12.3% growth in 2013 and 13.4% in 2014. This immense growth can be attributed to increase in data usage and growth of voice service (KNBS, 2015). Most businesses today are done over the mobile phones which has driven the subscriptions to high levels in Kenya – just like other parts of the world. In the last one decade, mobile subscribers in Kenya were barely 20 compared to today's over 80 in every 100 people.

Figure 1.8: Comparative Analysis for Mobile Subscriptions per 100 inhabitants



Source: ITU Statistics

1.1.6.4 Structure and performance of the Water and Sanitation Sector

This sector forms part of the Africa Infrastructure Development Index (AIDI) which uses two key parameters to assess the level of infrastructure in this sector i.e. Percentage of population with access to adequate amount of water and Percentage of the population with access to improved sanitation facility. Noting that Kenya is a water deficient county, the Vision 2030 social pillar aimed at: conserving water sources, starting innovative ways of collecting and using underneath water, increasing the acreage of irrigated land as well as construction of water and sanitation facilities for industries and the ballooning urban population.

The Jubilee coalition manifesto prioritised water in its second pillar denoted as Economy ‘Uchumi’ with an overall aim of safe, clean water for all. Similarly, the MTP II considers improvement of water and services among other sectors in the social pillar as an ‘investment in the people of Kenya’, in addition to emphasising the strong link that exists with other productive sectors including; manufacturing, energy, tourism and agriculture. Recently the Jubilee government formed a new ministry of Water and Irrigation to spearhead water management, water policy & regulation and irrigation services in the country.

In terms of performance, the sector's contribution to GDP has been fairly constant at 0.9% from 2010 to 2013 and dropped to 0.8% of the GDP in 2014 (KNBS, 2014). In addition, the sector portrayed marginal performance between 2013/2014 and 2014/2015 (WASREB, 2016).

Table 1.5: Key performance indicators

Key Performance Indicators	2013/14	2014/15	Trend
Water Coverage, %	53	55	↑
Drinking Water Quality, %	91	92	↑
Hours of Supply, hrs/day	18	18	→
Non- Revenue Water, %	42	43	↓
Metering Ratio, %	89	90	↑
Staff Productivity, Staff per 1000 Connections	7	7	→
Personnel expenditure as % of O+M Costs, %	42	42	→
Revenue Collection Efficiency, %	93	96	↑
O+M Cost Coverage, %	100	99	↓
Sewerage, %	16	15	↓

Sector Benchmarks: ■ good ■ acceptable ■ not acceptable ■ benchmark varies

Source: Adapted from WASREB's Impact Report Issue No. 9

The functions of the water and sanitation sector in Kenya are executed by a rich supplement of institutions involved with various roles as indicated outlined in Table 1.6 below.

Table 1.6: Institutions in the Water Sector

Institution	Legal Instrument	Role in Water and Sanitation Sector
Water Resource Management Authority	Water Act 2002	The lead agency in water resources management.
National Water Conservation & Pipeline Corporation	Water Act 2002	Development and management water infrastructure towards enhancing water security and storage for multi-purpose uses, mitigation of drought and flood effects in a sustainable manner
Kenya Water Institute	KEWI Act 2001	To offer training, administer examinations offer research and consultancy services in the wider water sector.
Water Services Boards (WSBs)	Legal Notice No.69	Responsible for efficient and economical provision of water services, developing water facilities, applying regulations on water services and tariffs, procuring and leasing water and sewerage facilities, Contracting Water Service Providers (WSPs).
Water Services Trust Fund	Water Act, 2002	Assisting in financing the provision of water services to areas of Kenya which are without

		adequate water services
Water Services Regulatory Board	Water Act 2002	• Regulation and monitoring of Water Services Boards.
Water Appeals Board	Water Act, 2002	Arbitration of water related disputes and conflicts.
National Irrigation Board	Irrigation Act, Cap 347	To provide for the development, control and improvement of irrigation schemes

Source: Author compilation using information from Ministry of Water and Irrigation and related SAGAs

1.1.7 Challenges facing infrastructure development

Poverty proliferation in Africa, the slow growth recorded in sub-Saharan Africa and particularly the retarded growth in Kenya between 1980s and 1990s may be linked slow growth in the infrastructure development. The infrastructure gap in many African economies and inadequate attention by most governments have exacerbated the underdevelopment in Africa. The unique and dynamic demographic in Africa has been projected to inject over 435 million people into her work force by 2035 (OECD, 2015). For this to happen, a well interwoven economy characterised by high market connectedness, efficient transport, socially vigorous society as well as stable policy framework is a necessary condition.

Investment in infrastructure requires heavy capital outlay. Most African countries depend on developed countries and development institutions for grants and loans to finance infrastructure development in Transport, energy, water and sanitation and ICT. As a result of this dependency countries remain indebted for many years. In addition, such loans are often tied in the sense that their use and expense are conditioned on targeted objectives. This limits the choices of investment options available to the African governments in the infrastructure space.

Among the major contributors of huge infrastructure deficit in Africa are low stock of infrastructure in energy and transportation and meagre harnessing of the great potential ICT. This is a significant impediment towards effective regional integration as it erodes gains made in domestic productivity (WEF, 2013). The economic growth in Africa is estimated to be reduced by 2% on the account of infrastructure deficit annually and if this gap was closed then domestic firms would boost of at least 40% gains in their productivity (Africa Competitiveness Report, 2013).

The lack of innovative approaches to circumvent financing deficit also contribute to the large deficit of Infrastructure in Africa. Unaffordable rural electricity and destruction due to

volatile political environment also dampen efforts geared towards closing deficiencies in infrastructure (Kenya Economic report 2009). As such approaches such as Public Private Partnerships are essential as they open up opportunities for collaboration between public and private institutions in financing infrastructure development.

The issue of inadequate human resource capacity presents a critical bottleneck towards infrastructure gap in Kenya. Albeit institutions with clear mandates to inform and contribute to relevant infrastructural reforms exist, the capacity of the later manpower is wanting. This challenge is exacerbated by poor inter-institutional coordination and constant interference with autonomy of these institutions which ultimately jeopardises realisation of economic gains through infrastructural development.

1.1.8 Reforms in infrastructure sectors in Kenya

The infrastructure space in Kenya has undergone various reforms in the recent past. For purposes of this study, reforms will be discussed in two areas which include: Sectoral governance and Private Sector Participation.

i. Sectoral governance

Proper governance is inevitable in organisation today. In line with this, the Government of Kenya has often instituted measures geared towards improving how the functional areas are managed. The key reform to ensure proper governance in the sectors covered in this study has been separation of responsibilities for effectiveness in service delivery. For instance, in the Water and Sanitation Sector, the enactment of the Water Act in 2002 translated into separation of water resources management and development from service provision and successful commercialisation of water service delivery (CSP, 2014 – 2018). Similar reforms in the energy sector have been instituted where generation, transmission and distribution of electric power were separated. The latter led to creation of three autonomous companies to execute the said functions⁷ (AfDB, 2016).

ii. Private Sector Participation (PSP)

Private sector participation in infrastructure development has a link to competitiveness of a country's economy. In this recognition, OECD (2007) developed twenty four principles for private sector participation in infrastructure projects where principle 7 states, "*The benefits of*

⁷ More details of the institutions and their functions are discussed in Section 1.16 of this study.

private sector participation in infrastructure are enhanced by efforts to create a competitive environment, including by subjecting activities to appropriate commercial pressures, dismantling unnecessary barriers to entry and implementing and enforcing adequate competition laws.” There are two major justifications given for private sector participation namely: the need to deliver best quality and quantity of public services and management of public funds efficiently while delivering public services to citizens (Schramm, 2006).

Schramm (2006) in his study of PSP in urban services in the MENA region defines PSP as a risk-sharing association between public and private sectors to attain the desired policy result and shared benefit. Further, he explains that there is always a temptation of confusing privatisation with Public-Private Partnership (PPP) where the former means ownership is transferred from a public sector ownership to fully-fledge private ownership while the latter is mainly distinguished by shared gain from the investment.

In Kenya, the emphasis of importance of PSP in infrastructure development got a renewed momentum when the NARC government came to power in 2003. The government’s national development priorities inclined towards revamping and rejuvenating infrastructure development including roads, rails, power, communication and energy infrastructure (PPIAF, 2013). PSP concept in Kenya became active in mid 1990s but accelerated in from 2004 onwards.

1.2. Statement of the Problem

The global competitiveness rankings in the last three years have revealed an increasingly low competitiveness and economic productivity among countries in the Sub-Saharan Africa (GCI, 2016). The participation in international trade has been comparatively lower globally owing to lesser success in the integration efforts (Mbekeani, 2007) and lack of sound investment policies. This has resulted to less competitive exports in world markets and hence low price of the exports. The World Economic Forum (2016), associated under development of sub-Saharan Africa with high infrastructure deficit and pressure on public finances.

The growing need to address problems such as poverty and unemployment in various countries has made governments to take deliberate actions to stimulate growth in economic sectors. In Kenya, the major policy blue print in history is the Vision 2030 which lays a heavy emphasis on infrastructure development as the key driver for overcoming economic backwardness that has rocked the country in the last two decades and for ameliorating

competitiveness of domestic commodities in foreign markets. As shown in section 1.15 of this study, the current and the past governments made immense investment in different infrastructure. However, this investment has not contributed to higher growth in exports as would be expected.

The growth in Kenya exports has on average been outpaced by import growth (See table 1.1). The need to empirically determine how infrastructure development affects exports as a proxy to competitiveness is thus vital. Past studies in Kenya have linked particular sectors to economic growth⁸. The government needs a guideline on investment agenda especially in the priority sectors as it implements Vision 2030. Little evidence is available on how infrastructure in Kenya affects competitiveness. In fact, sectors such as Energy and Water & Sanitation and the nexus they have on economic growth, productivity and competitiveness have limited empirical work in Kenya⁹. This study will therefore focus on closing this gap establishing the relationship that exists between infrastructure development in Transport, Energy, ICT & Water and Sanitation and economic competitiveness in Kenya.

1.3. Objectives of the Study

1.3.1 General Objective

To establish the relationship between infrastructure development and Economic Competitiveness of Kenya taking into account selected Sub-Saharan African countries.

1.3.2 Specific Objectives

- i. To determine the relationship between infrastructure and competitiveness of Kenya.
- ii. To quantify the size of the relationship between infrastructure and competitiveness of Kenya.
- iii. To make policy recommendations based on study findings.

1.4. Research Questions for the Study

This study sought to answer the questions below:

- i. What is the relationship between infrastructure developments on competitiveness of Kenya?

⁸ Studies in Kenya covering particular sectors include: Wasike (1991), Ndirangu (1994), Omondi (2014) among others.

⁹ This statement is in the best knowledge of the author

- ii. What infrastructure sector drives higher competitiveness in Kenya?

1.5. Significance of the study

This study was motivated by two main factors. First, the Kenya Economic Blueprint - the Vision 2030 identifies infrastructure development among the key drivers towards achieving shared prosperity in Kenya by 2030. Secondly, understanding the impact of infrastructure development on the economy can go a long way into enhancing proper forward looking policy.

Studies done in Kenya attempt to investigate effect of particular infrastructure development such as transport infrastructure on competitiveness of a country or on economic growth. Most of the empirical work in Kenya focussing on infrastructure development are limited certain geographical jurisdiction. For instance, Wasike (1991), Ndirangu (1994) and Rutto (1997) carried their studies in Busia, Nyeri and Kericho respectively. Others focus on one component of infrastructure. For instance, Omondi (2014) investigates the role of transport infrastructure in enhancing regional integration in Kenya. This study bridges this gap by focussing on impact of Transport, Energy, water & sanitation and ICT sectors in Kenya and on the competitiveness of the economy.

This study will not only be crucial for government policy but will also help researchers and academic get more insights on impact of infrastructure development on economic competitiveness of Kenya.

1.6. Organisation of the Study

The rest of the paper is organised as follows: chapter two provides a review of theories and empirical works related to this study, the methodology followed is discussed in chapter three, empirical results in chapter four and chapter five presents summary and conclusion, policy implications and recommendations of areas for further study.

2 CHAPTER TWO: LITERATURE REVIEW

Introduction

This chapter provides two sections. Section one analyses theoretical literature on competitiveness of a country. Section two reviews empirical work related to competitiveness and infrastructure development. The rear section provides an overview of literature.

2.1 Theoretical Literature Review

The classical economists provide a foundation upon which economic competitiveness of a nation can be analysed. Working of the economy and seminal contribution to theory of trade are among the key contributions Adam Smith and his student David Ricardo made in economics.

Adam Smith (1776) in his book, “Wealth of Nations”, emphasises the importance better of wages as a key determinant of a prosperous nation and world. He lays bare the fact that the actual wealth of a nation does not matter but the persistent proliferation reflected by rise in earnings of labour. Concentration of skills into practical economic areas can be an input to triggering innovation and entrepreneurship which then raises overall rewards for labour in a society. In contributing to the theory of value, Ricardo maintained that labour was the only determinant of value. He argued that by increasing the number of productive workers or by harnessing their productive power, value of an economy would automatically increase. It is clear from these classical views that, competitiveness of an economy could be measured by how well labour as a factor of production could be rewarded such that the better the wages the more competitive the economy is.

Standard assumptions of international trade postulate that there exist perfect competition in both product and factor markets and the production functions of a country exhibits constant returns to scale. As such, each country has same technology for producing each good and firms’ sole objective is to maximise their profits. In this context, Adam Smith’s absolute advantage theory suggested that labour is the only factor of production and a country concentrates in production of goods that require lesser labour hours. A critic by Ricardo on this model stems from its inability to explain what would happen if one country is more efficient in producing both goods. Contrary to Smith’s view, Ricardo maintains that countries stand to benefit from trade even if one is more efficient in producing both goods.

Competitiveness of a nation can therefore be analysed using comparative advantages and therefore there is still a justified reason for two countries to engage in trade.

The classical models suffer two major setbacks. First, they are unable to espouse effects of a country's factor distribution on trade. The factor proportions models such as the Hecksher Ohlin (H-O) model bridge this gap since they assert that trade patterns are determined by factor endowment at National level and the way technology allow combination of factors to produce similar products. Unlike the classical models, H-O model include capital as an additional factor of production. Trade therefore occurs where relative differences in factor endowment is realised such that capital-rich countries export capital intensive goods while labour-rich country exports labour intensive goods. Similarly, capital-rich countries import labour intensive goods while labour-rich countries import capital intensive goods. Competitiveness in this case can thus be proxied by resource endowment of a country (Ayieko, 2011).

Empirical evidence over the years has supported the classical argument that labour costs or productivity influence trade patterns in an economy. For instance, Dornbusch et al (1977) extended the comparative advantage theory by Ricardo to include, more than two commodities, transportation costs and exchange rate and concluded that labour productivity plays a critical role in the determination of trade patterns. In this regard, they maintain that comparatively countries simultaneously stand to gain from trade.

One of the major draw backs from the classical trade theories and their extensions is that they are non-robust enough to show the other determinants of competitiveness. In the recent literature, researchers have departed from this traditional belief by analysing the drivers of industrial competitiveness to mirror national competitiveness. This approach is attributed to Porter (1990) whose analysis used two fundamental singularities. First, he mapped thriving industries to competitive countries and secondly, he conducted a historic analysis to understand the dynamic process behind comparative advantage. Porter's framework is commonly known as the Porter Diamond concluded that six factors which include four inter-related components (Firm strategy, structure and rivalry; demand conditions; related and supporting industries; factor conditions) and two exogenous variables (Government and chance) determine competitiveness of a nation.

Moon et al (1998) extended Porter's home based diamond and observed that over and above home based conditions, Porter's diamond framework should have included foreign activities

as a crucial determinant of competitiveness. Particularly, analysing the newly industrialised economies of 1990s¹⁰ factors such as efficient infrastructure such as roads, ports, airports and telecommunications were rubberstamped to be key determinants of economic competitiveness.

Theoretical framework provided above is a good rationale for this study. A nation that is competitive thrives and is able to overcome economic challenges it faces. In this regard, developing key infrastructure especially in transport, energy, ICT and water & sanitation would determine competitiveness of an economy.

2.2 Empirical Literature

Empirical work available show a positive relationship between infrastructure development and economic growth or performance (e.g. Aschauer (1989), Ghosh et al (1998), Lee (2010), Deng (2013). Further, the role of infrastructure development on an economy's growth, productivity and competitiveness is observed to be a key factor that governments should concern themselves with due to the multiplicity of positive benefits (see World Development Report (1994) and Mbekeani (2007).

Some seminal work assessing nexus between public sector investments (particularly in infrastructure development) such as on streets, transport and water systems and sewers are mostly based on the developed countries. A good example is Aschauer (1988) who investigated the relationship between aggregate productivity and stock as well as flow of government spending variables in the USA between 1945 to 1989. Contrary to economic theory which says that increase in government expenditure raises real interest rates and crowds-out private investment, Aschauer used a generalised Cobb Douglas function to shows that movements in public investment induces similar movements in output from the private segment of the US economy. The dependent variable was output per capital in private business economy and the independent variables used were private sector labour input, private capital input, non-military public capital, private business total factor productivity and capacity utilisation rated in manufacturing. The overall finding indicated that core infrastructure¹¹ which comprised of 55% of the cumulative non-military stock¹² is highly

¹⁰ Porter (1990) and Moon et al (1998) both used Korea and Singapore in their analysis for Newly Industrialised nations.

¹¹ Aschauer (1988) defines 'core' infrastructure to include streets and highways, airports, electrical and gas facilities, mass transit, water systems and sewers.

significant with an elasticity of 0.24. He therefore concluded that core infrastructure bears the highest explanatory power of productivity (and therefore competitiveness) of an economy.

Bougheas et al (1999) analyse the relationship between infrastructure stock and increased specialisation in European six countries over the period 1970 to 1990. The study apply an augmented gravity model approach where the dependent variable is the logarithm of exports from one country to another while the independent variables are logarithms of gross domestic product (as a proxy of market sizes), logarithms of product of capital public capital and distances between the capital cities. In a separate equation, the length of motorway network is included as a distinct variable to measure transport infrastructure. The results indicate that the coefficients of infrastructure variables are positive and significant while those of GDP are smaller and positive. The improvement of R^2 values when additional infrastructure variables are introduced imply that volume of exports (and thus competitiveness of an economy) is highly determined by development on infrastructure.

Some studies dwell mostly on analysis of other empirical literature without necessarily going to econometric analysis e.g. Mbekeani (2007), Estache & Garsous (2012) and Deng (2013). Their work illustrate that economic performance and competitiveness could remain a dream if infrastructure development is unreliable. For instance, Mbekeani (2007) explores reasons of poor performance of Africa's exports and concludes that supply constraints related to infrastructure, institutional development and policy reforms in a political economy could be blamed for this. He also attributes the low success rate of integration efforts to underdeveloped marketing network in the domestic market, transport and communications. On the other hand, Estache and Garsous (2012) noted that not only the quantity of infrastructure but also its quality that matter in determining productivity of both human and physical capital. Like Aschauer (1988) and Mbekeani (2007), they argue that enhanced markets, improved education, upsurge of private investment and increased employment and income (and thus competitiveness) are key economic benefits of improved infrastructure.

The location of a country (i.e. geographical position) plays a role in determining which infrastructural needs for a country and consequently for a region. Garsous et al (2012)

¹² Other constituents of non-military capital stock were; Other Buildings (office buildings, police and fire stations, court houses, garages, passenger terminals), Hospitals, Conservation and development and educational buildings. The elasticities for all of them were found to be insignificant at 10% level of significance.

analysis of investment need observed that Sub-saharan Africa requires at least 15% of its GDP, Asia (6.5%), Latin America (4%) and MENA (4%) to sufficiently attain a productive infrastructure stock. This implies that central to determination of infrastructural needs and therefore competitiveness is the geographical factors. Considering cross-border externalities in the analysis of economic performance would have more sensible results. Similarly, access to infrastructure does not only conduce to GDP growth but also to higher social returns payoffs.

In Kenya, Ayieko (2011) investigates determinants of manufactured exports competitiveness using data from 1980 to 2010. Like Bougheas et al (1999), he applies the augmented gravity where the dependent variable is the logarithm of value of bilateral exports and the exogeneous variables are Gross National Product (measure for market size), nominal exchange rate, unit cost of labour, openness and infrastructure. The results indicate that even though investment in infrastructure was very low in East African Community (only 1 billion US dollars) it is a critical factor of determining a country's competitiveness as it facilitates trade by linking producers to the market.

Others who apply the gravity model takes no cognisance of the role infrastructure. For instance, Mogendi (2015) in his comparative analysis of export promotion schemes and export performance in EAC (Kenya, Uganda and Tanzania) uses export volume as the dependent variable and controlling for GDP, real exchange rate, foreign income, distance between countries, trade openness and dummies for export promotion schemes. The study uses distance as a proxy of transport cost and finds it insignificant in determining export volumes. Similar findings are found by Elshehawy et al (2014) who applied the gravity model using panel data to analyse factors affecting Exports from Egypt to its main trading partners and concluded that the distance variable had an insignificant effect on exports. Contradicting results on the effect of distance trade is found by Doumbe Doumbe et al (2015) in their analysis of Cameroon – EU trade. They found distance significant in the determination of bilateral trade between two countries.

2.3 Overview of Literature

Both theory and empirical literature provided in the preceding sections of the study are in agreement that resource endowment, market size and geographical characteristics are important in determining a country's trade which in turn drives productivity and competitiveness of an economy. In particular, underdevelopment of infrastructure may limit a country from integrating well with the rest and may exacerbate poverty levels. This implies that a country is unable to effectively link production to markets as the trade facilitation factors (infrastructure) are underdeveloped (Mbekeani, 2007).

Even though efforts to develop relevant infrastructure to facilitate trade in EAC countries is evident, little has been done to determine the impact of energy consumption, growth of ICT and telecommunication and recognising the role of water and sanitation sector in driving manufacturing, transport or ICT. For instance Ong'ang'a 2010 (ICT in Kisumu), Ayieko 2011 (Manufacturing in EAC), Ombara 2013 (Transport), and Mogendi 2015 (Manufacturing in EAC). Those who study infrastructure as a sector are localised to Kenya and do not clearly explain the impact of developing infrastructure in transport, ICT, energy and water and sanitation on competitiveness of goods from Kenya.

The study will address two insufficiencies noted by in the available literature in Kenya. First, it will empirically establishing the link between the 4 key sectors independently to economic competitiveness which many of the studies fail to recognise. The results may answer the scarcely researched question on which infrastructure matter most (Estache & Garsous 2012)? Secondly, the study will apply the gravity model using most recent data taking cognisance of the market size and distances between countries.

3 CHAPTER THREE: METHODOLOGY

Introduction

This section explains the proposed methodology for this study.

3.1 Theoretical Framework

The discovery of the law of gravity by Isaac Newton in 1687 advanced new breakthrough in other fields of knowledge such as geophysical sciences, economics among others. The law asserts that there exists a gravitational force amid two particles or objects which is directly proportional to their masses and inversely proportional to the space between them (often measured by the physical distance separating them). Its basic algebraic formulations are as shown below:

$$F = \emptyset \frac{w_1 w_2}{s^2} \dots\dots\dots (1)$$

Where F is the gravitational force, $\emptyset$ is a constant representing the gravitation constant, w_1 and w_2 are masses of objects 1 and 2 respectively and s^2 is the square of the physical distances separating them.

In economics, this framework of the gravity model has been applied in international trade especially in analysis of trade between two countries (Bougheas, 1999; Mogendi, 2013 and Doumbe Doumbe, 2015). In this paper, we analyse the competitiveness of Kenya in the context of lower middle income countries in SSA. We postulate that competitiveness of Kenya (export volume will be used as the proxy) to be directly influenced by market size and inversely affected by distance. We therefore use the following functional form:

$$C_{ab} = \alpha \frac{Y_a Y_b}{L} \dots\dots\dots (2)$$

Where:

C_{ab} is competitiveness of goods from country a to country b,

α is a constant

Y_a and Y_b are the GDP of country a and b respectively (both which are proxies of market size)

L is the distance between the capital cities i.e. Nairobi to the capital cities of selected SSA countries.

The theoretical and empirical literature guides factors that influence competitiveness of a nation. We therefore use export volume of a country ‘a’ to ‘b’ for the dependent variable and as a proxy of competitiveness.

3.2 Specification of the Gravity Model

We follow Bougheas et al (1999), Elshehawy et al (2014) and Doumbe Doumbe et al (2015). These authors apply a variant of the gravity model to empirically examine factors that affect bilateral trade in different international contexts. The model specified below enables analysis impact of infrastructure development on economic competitiveness of Kenya.

Equation 2 can be rewritten on logarithmic form so as to linearize the variables. The equation takes the form;

$$\log C_{ab} = \alpha + \log Y_a + \log Y_b - \log L \dots\dots\dots (3)$$

We use the variant form of this model (commonly referred to as the Augmented Gravity Model) to add other variables including infrastructure variables. This model will use specific variables related to the main sectors of concern in this study i.e. Transport, Energy, ICT and Water and Sanitation. In the augmented form, Competitiveness will be a function of GDP, Labour force, official exchange rates, infrastructure variables and distance.

The augmented equation will be of the form:

$$C_{ab} = f(Y_{ab,t} F_{ab,t} EXC_{ab,t} TR_{ab,t} ICT_{ab,t} EN_{ab,t} WS_{ab,t} L_{ab,t}) \dots\dots\dots (4)$$

This means that Competitiveness (proxied by the volume of exports) is influenced by GDP (Y), Labour force (F), Exchange rate (EXC), Infrastructure Variables i.e. Transport (TR), Information Communication Technology (ICT), Energy and Water & Sanitation and Distance (L) between two countries.

The independent variables will be specified in a manner that addresses multicollinearity problems in the model. Following Bougheas et al (1999) the size variables (GDP) are written separately while the product of infrastructure variables between country a and b are used to address multicollinearity. We will therefore estimate the following equations.

Base Equation¹³:

$$\text{Log } C_{ab,t} = \alpha_0 + \alpha_1 (Y_{a,t}) + \alpha_2 (Y_{b,t}) + \alpha_3 (F_{a,t}) + \alpha_4 (F_{b,t}) + \alpha_5 (\text{EXC}_{a,t}) + \alpha_6 (\text{EXC}_{b,t}) + \alpha_7 (L_{ab}) + \varepsilon_{ab,t} \dots \dots \dots (5)$$

Transport Variable (TR)

$$\text{Log } C_{ab,t} = \alpha_0 + \alpha_1 (Y_{a,t}) + \alpha_2 (Y_{b,t}) + \alpha_3 (F_{a,t}) + \alpha_4 (F_{b,t}) + \alpha_5 (\text{EXC}_{a,t}) + \alpha_6 (\text{EXC}_{b,t}) + \alpha_7 (\text{TR}_{a,t} \text{TR}_{b,t}) + \alpha_8 (L_{ab}) + \varepsilon_{ab,t} \dots \dots \dots (6)$$

ICT Variable (ICT)

$$\text{Log } C_{ab,t} = \alpha_0 + \alpha_1 (Y_{a,t}) + \alpha_2 (Y_{b,t}) + \alpha_3 (F_{a,t}) + \alpha_4 (F_{b,t}) + \alpha_5 (\text{EXC}_{a,t}) + \alpha_6 (\text{EXC}_{b,t}) + \alpha_7 (\text{ICT}_{a,t} \text{ICT}_{b,t}) + \alpha_8 (L_{ab}) + \varepsilon_{ab,t} \dots \dots \dots (7)$$

Energy Variable (EN)

$$\text{Log } C_{ab,t} = \alpha_0 + \alpha_1 (Y_{a,t}) + \alpha_2 (Y_{b,t}) + \alpha_3 (F_{a,t}) + \alpha_4 (F_{b,t}) + \alpha_5 (\text{EXC}_{a,t}) + \alpha_6 (\text{EXC}_{b,t}) + \alpha_7 (\text{EN}_{a,t} \text{EN}_{b,t}) + \alpha_8 (L_{ab}) + \varepsilon_{ab,t} \dots \dots \dots (8)$$

Water & Sanitation Variable (WS)

$$\text{Log } C_{ab,t} = \alpha_0 + \alpha_1 (Y_{a,t}) + \alpha_2 (Y_{b,t}) + \alpha_3 (F_{a,t}) + \alpha_4 (F_{b,t}) + \alpha_5 (\text{EXC}_{a,t}) + \alpha_6 (\text{EXC}_{b,t}) + \alpha_7 (\text{WS}_{a,t} \text{WS}_{b,t}) + \alpha_8 (L_{ab}) + \varepsilon_{ab,t} \dots \dots \dots (9)$$

Estimated Equation

$$\text{Log } C_{ab,t} = \alpha_0 + \alpha_1 (Y_{a,t}) + \alpha_2 (Y_{b,t}) + \alpha_3 (F_{a,t}) + \alpha_4 (F_{b,t}) + \alpha_5 (\text{EXC}_{a,t}) + \alpha_6 (\text{EXC}_{b,t}) + \alpha_7 (\text{WS}_{a,t} \text{WS}_{b,t}) + \alpha_8 (L_{ab}) + \varepsilon_{ab,t} \dots \dots \dots (10)$$

The projected signs of elasticities $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ and α_7 are positive while α_8 is expected to be negative since distance amplifies the transaction costs of trade which hinders competitiveness of the goods and services of a country.

3.3 Data Sources, types and Measurements

The study will cover selected lower middle income countries in Sub-Saharan Africa¹⁴ ranging from 2000 to 2013. The selection of the countries will be guided by two factors namely: availability of data and income classification. Data on exports, exchange rate, labour and infrastructure variables will be obtained from the World Development Indicators (2016)

¹³ Logarithms are used so as to linearize the equations.

¹⁴ The Countries selected for this study include: Kenya, Cameroon, Congo Republic, Ghana, Nigeria, Sudan and Zambia.

while distances (in miles) between Nairobi and the rest of capital cities will be obtained from the distance calculator¹⁵.

The variables and sources of data summarised in the following table:

Table 3.1: Description of variables and sources

Variable Name	Proxy	Description	Source
Competitiveness	$\log C_{ab}$	Sum of exports volumes from country a and b	WDI data base (2016)
GDP	Y_a and Y_b	GDP for Kenya and other countries (constant 2010 US \$)	WDI data base (2016)
Labour force	F_a and F_b	Total number of people who supply their labour towards production of goods and services in a particular time period for Kenya and other lower middle income countries	WDI data base (2016)
Exchange rate	EXC_a and EXC_b	Official exchange rates determined by relevant legal institutions	WDI data base (2016)
Transport	TR_a, TR_b	Product of Air transport, registered carrier departures worldwide	WDI data base (2016)
ICT	ICT_a, ICT_b	Product of number of mobile cellular subscription per 100 people in Kenya and Other Countries	WDI data base (2016)
Energy	EN_a, EN_b	Product of Energy Use (Kg of Oil equivalent per capita) in Kenya and Other Countries	WDI data base (2016)
Water and Sanitation	WS_a, WS_b	Product of amount of renewable internal fresh water resources per capita in cubic metres for Kenya and Other Countries	WDI data base (2016)
Distance	L_{ab}	Distance (in miles) between Nairobi and Capital Cities of other Lower Middle income countries	Distance Calculator

The percentage increase of the export volumes when a unit of either of the predictor variables is changed are depicted by the coefficients. The study will use panel data for a time period from 1992 to 2013. Elshehawey et al (2014) and Doumbe Doumbe (2015) note the three main advantages of panel data approach as; ability to find relationships among variables over time and ability to display individual effects and avoids biased estimates.

¹⁵ Elshawey et al (2014) used distance calculator to compute distances in miles from Cairo, Egypt to the capital cities of the major trading partners.

Diagnostics Tests

The estimations involved carrying out the Hausmann's test to determine the model to use, that is, whether the fixed effects model or the random effect model. The test was essential as its result informs the appropriate model to use Doumbe Doumbe et al (2015). The panel unit root tests were carried out using Levin Lin Chu test. This is important to ensure that the regression is carried out by using stationary variables – avoiding spurious regression estimates.

4 CHAPTER FOUR: EMPIRICAL RESULTS

Introduction

This chapter presents the results analysed from World Bank data of Kenya and her lower middle income countries in SSA for the period between 2000 and 2013. Since the data has taken panel dimension, Kenya's export volume was considered against interaction between Kenya and selected lower middle income countries in SSA GDP, interaction between Kenya and selected lower middle income countries in SSA labour force, interaction between Kenya and selected lower middle income countries in SSA exchange rate, interaction between Kenya and selected lower middle income countries in SSA transport infrastructure, interaction between Kenya and selected lower middle income countries in SSA ICT infrastructure, interaction between Kenya and selected lower middle income countries in SSA energy infrastructure, interaction between Kenya and selected lower middle income countries in SSA water and sanitation infrastructure and the distance between Kenya and the selected lower middle income countries in SSA. The selected Kenya's lower middle income countries in SSA were Cameroon, Congo republic, Ghana, Nigeria, Sudan and Zambia. A regression analysis was undertaken to determine the impact of selected exogenous factors on Kenya's export volume.

4.1 Descriptive Statistics

Descriptive statistics of the data series is shown in table 4.1. Descriptive statistics of Kenya's export volume, Kenya's export volume was considered against interaction between Kenya and selected lower middle income countries in SSA GDP, interaction between Kenya and selected lower middle income countries in SSA labour force, interaction between Kenya and selected lower middle income countries in SSA exchange rate, interaction between Kenya and selected lower middle income countries in SSA transport infrastructure, interaction between Kenya and selected lower middle income countries in SSA ICT infrastructure, interaction between Kenya and selected lower middle income countries in SSA energy infrastructure, interaction between Kenya and selected lower middle income countries in SSA water and sanitation infrastructure and the distance between Kenya and the selected lower middle income countries in SSA. Distribution of a series can be determined by evaluating various statistical measures as shown in table 4.1.

Table 4.1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
exp	14	7210	1470	4860	9050
gdp	98	64200	98700	7630	425000
labf	98	13.3	13.9	1.24	5420
exc	98	187.9367	238.6937	0.5449192	733.0385
Trtr	98	49700	109000	24741	581000
ictict	98	1542.87	2180.165	0.0099426	7764.234
enen	98	182681.1	104433.1	439.3543	380443.1
wsws	98	1444390	6131576	41500000	43200000
dist	98	1481.143	777.6951	0	2600

Source: Author's Computation based on World Bank Database

The total observations considered in this study were 98 with nine variables (one dependent and eight independent variables). Range is obtained from the difference between the maximum value and minimum value. For example the maximum value of Kenya's export volume is 9050 million Kenyan shillings while the minimum is 4860 million Kenyan shillings giving a range of 4190 million Kenyan shillings. The standard deviation indicates the spread of the values from the mean and is of great importance for comparison purposes. The data indicates that interaction between Kenya and selected lower middle income countries in SSA water and sanitation infrastructure has a larger spread as compared to other variables. Kenya's export volume has a standard deviation of 1470; interaction between Kenya and selected lower middle income countries in SSA GDP has 98700 whereas interaction between Kenya and selected lower middle income countries in SSA energy infrastructure has 104433.1.

4.2 Correlation Matrix

Correlation of the variables is examined in the table shown below.

Table 4.2: Correlation Matrix

	gdp	Labf	exc	Trtr	ictict	Enen	wsws	Dist
gdp	1.00							
labf	0.96*	1.00						

exc	-0.15	-0.24	1.00					
trtr	0.71	0.57	-0.06	1.00				
ictict	0.14	0.03	0.023	0.48	1.00			
Enen	0.59	0.49	-0.06	0.48	0.30	1.00		
Wsws	-0.11	-0.17	0.33	-0.06	0.04	-0.02	1.00	
Dist	0.30	0.24	0.12	0.25	0.27	0.53	0.02	1.00

**Highly collinear pair*

Source: Stata output

Correlation analysis is used to determine the extent of the correlation of different pairs of variables under study. It measures the correlation coefficient between 1 and -1. This further predicts presence or absence of multicollinearity which is considered to exist when there is perfect linear relationship between the variables under the study. The correlation matrix was used to determine if any pair of independent variables was highly collinear through the magnitude of the correlation coefficient of the pairs of variables established. This bias arises when one or more pairs of independent variables are perfectly correlated to each other. Multicollinearity would be considered present if the correlation coefficient was equal to or above 0.8 as it may lead to spurious regression. As indicated in Table 4.2, the study found that interaction between Kenya and selected lower middle income countries in SSA GDP and interaction between Kenya and selected lower middle income countries in SSA labour force had a correlation of more than 0.8 an indication that there may be Multicollinearity. To correct that, the study applied step wise differencing to variable exhibiting this characteristic.

4.3 Unit root test

Unit root tests were applied to investigate or detect non stationary in all the study variables which in turn leads to spurious estimates. In this case, all Kenya and the selected lower middle income countries' characteristics under study were subjected to Levin-Lin-Chu unit-root test. In this test if variables are found to be non- stationary, first differencing is applied until the bias is eliminated. Presence of unit root leads to spurious regressions. The null hypothesis in this case was that the variable under consideration was non-stationary or has unit root and in this study, it was stated as; Null hypothesis (H_0): Panels contain unit roots and alternative hypothesis (H_1): Panels are stationary. Results for unit root test are shown in table 4.3.

Table 4.3: Unit Root Tests

Variables	Unadjusted t-statistic and p values	Unadjusted t-statistic and p values after first difference	Unadjusted t-statistic and p values after Second difference
Export volume	-1.4299 (0.0764)	-2.7518 (0.0030)	
GDP	3.8629 (0.9999)	-2.4719(0.0067)	
Labour force	4.7244 (1.0000)	-0.3750(0.3538)	-4.6876(0.0000)
Exchange rate	-1.6084 (0.0539)	-3.0044(0.0013)	
Transport infrastructure	3.4853 (0.9998)	-2.7325(0.0031)	
ICT infrastructure	1.0380 (0.8504)	-1.7037(0.0442)	
Energy Infrastructure	1.2995 (0.9031)	-6.3012(0.0000)	
Water and Sanitation Infrastructure	-5.6062(0.0000)		

Source: Author's Computation based on World Bank Database

From Table 4.3, the Levin-Lin-Chu unit-root test revealed that all variables had p values more than significance level of 0.05 which led to failure to reject the null hypothesis (that the variables had unit root). To obtain stationary, the variables were differenced. All variables were found to have one unit except the interaction between Kenya and selected lower middle income countries in SSA labour force which had two unit roots.

4.4 Hausmann Specification Test

To determine which model best fits the data or is the most appropriate for the estimation, we performed the traditional Hausman test (Hausman, 1978) which is identical asymptotically to the Wooldridge (2002) test where we first estimate the fixed effects model, save the coefficients and compare them with the results of the random affects model. Hausman specification test is then carried out and decision made whether fixed effects model or random effects model is appropriate. In this test, the null hypothesis states that random effects model is appropriate whereas the alternative hypothesis states that fixed effects model is appropriate. The Hausmann test results are shown in table 4.4.

Table 4.4: Hausmann Test

Test: Ho: difference in coefficients not systematic (random effect model is appropriate)
$\chi^2(7) = (b-B)'[(V_b-V_B)^{-1}](b-B)$
= 0.00
Prob>chi2 = 0.0422
(V _b -V _B is not positive definite)

Source: Stata Output

From table 4.4, probability value of 0.0422 is significant thus leading to the rejection of the null hypothesis. This therefore implied that fixed effects model was the appropriate in estimating the relationship between dependent and the explanatory variables.

4.5 Normality, Heteroscedasticity and Autocorrelation Tests

Due to time series component, the fixed effects model makes assumptions on normal distribution of the stochastic random error term, linearity, constant variance of error terms across observations and no serial autocorrelation of the error terms. However, regarding heteroscedasticity and autocorrelation, Waldinger (2011) suggests that standard regression packages (like STATA) will do the adjustment of standard errors automatically if one specifies a fixed effects model. This implies that panel data approach takes care of the presence of varying variance of the error terms across all the observations in the panels and any suspected or proved correlation between random error terms of the subsequent time periods.

4.6 Estimation results and Discussion

Panel data approach takes care of the presence of varying variance of the error terms across all the observations in the panels and any suspected or proved correlation between random error terms of the subsequent time periods. Having carried out diagnostic tests, unit root test and Hausmann specification test, fixed effects model regression was estimated and the results are as shown in table 4.5.

Table 4.5: Estimation Results Using Fixed Effects

Dependent Variable: log of Kenya's export Volume				
Method : Fixed Effects model				
Variable	Coefficient	Standard Error	t	P>t
D1GDP	3.78**	5.671	3.07	0.030
D2labour force	4.75**	2.52	2.29	0.047
D1Exchange rate	-0.0040627	0.008202	-0.50	0.638
D1Transport Infrastructure	3.12**	3.82	2.02	0.046
D1ICT infrastructure	-0.0013809	0.00732	-0.19	0.857
D1Energy Infrastructure	0.0005767***	0.0057896	1.99	0.084
D1Water and sanitation infrastructure	-0.0000493	0.0001341	-0.37	0.726
D1Distance	0	(omitted)		
Constant	21.47*	3.50361	6.13	0.001
R-Squared: Within = 0.9291 Between = 0.9320 Overall = 0.9291 F(7,6) = 11.23 Prob > F = 0.0045*				

Source: Author's Computation based on World Bank Database

4.6.1 Interpretation of the Results

From table 4.5, *, **, *** indicates significance at 1%, 5% and 10% level of significance respectively. The results showed total variations of 92.91% and 92.91% explaining economic competitiveness within Kenya and overall taking into account SSA countries in the scope of this study whereas the other fraction (7.09% and 7.09%) may have been factored in by other factors not considered by this study. The overall significance was found to be 0.0045 meaning that all variables interacting between Kenya and selected lower middle income countries in SSA (i.e. GDP, labour force, exchange rate, transport infrastructure, ICT infrastructure, energy infrastructure, water and sanitation infrastructure) utilized in the model were statistically significant at the selected significance levels (1%, 5%, and 10%) in explaining the economic competitiveness in Kenya.

The results further revealed that first difference of the GDP, second difference of labour force, first difference of transport infrastructure and first difference of energy infrastructure considered in the study are important in determining Kenya's export volume.

4.6.2 Discussion of the Findings

This study explored the significance of Kenya and selected lower middle income countries in SSA' infrastructural development and other control variables as suggested by the literature on Kenya's economic competitiveness that was measured by export volume. The variables that had insignificant coefficients were not discussed as they do not contribute to any working policy of the study. From the results, if all factors were kept constant, Kenya's export volume as a proxy for country's economic competitiveness would be 2,110 million Kenyan shillings (Antilog of 21.47). The coefficient of the first difference of GDP is positive and exclusively statistically significant in influencing Kenya's export volume. This means that holding all other factors constant, one percent increase in the first difference of GDP leads to approximately 378% increase in Kenya export volume. This finding follows economic theory since as GDP of a country increases, local and foreign investors are attracted to invest in production of export goods and service. On the same point, increase in the GDP (which may enhance the purchasing power) of other countries proliferates demand for goods and services from other countries.

The coefficient of the second difference of labour force is positive and independently statistically significant. This means that if labour force increase by one percent, Kenya's export volume increases by 475 percent. The finding supports the classical economist's (David Ricardo) postulation in the renowned 'theory of value' that harnessing the number of productive workers automatically increases the value of the economy.

The coefficient of the first difference of transport infrastructure is positive and discretely statistically significant in influencing Kenya's export volume. This coefficient implies that Kenya's export volume increases by 312 percent when transport infrastructure variable increases by one percent. The finding backs Mbekeani (2007) finding that transport infrastructure is critical in enhancing market linkages which in turn drives her interconnectedness and competitiveness of the economy leading to enhanced sales (exports) in foreign markets.

The coefficient of first difference of energy infrastructure is positive, as well as, statistically significant on its own in affecting Kenya's export volume. This coefficient shows that if energy infrastructure increase by one percent, Kenya's export volume increase by about 0.05

percent. The finding is line with the fact that energy is an indispensable input especially in manufacturing sector which is critical in fueling industrialization and also promotes exports earnings.

5 CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The chapter provides a detailed recap of the study findings and policy recommendations and ends with a snapshot of shortcomings and/or limitations and recommendation of probable future research areas.

5.1 Summary and Conclusions of study

Kenya's economic competitiveness has been steady as compared to other African countries. This indicates that the country has the potential of producing more products for exports. Kenya's potential to become more competitive is upheld by her growth in real GDP which is higher than the World's and Sub-Saharan African countries' average (World Bank, 2015). Though Kenya is seen to be doing well in terms real GDP growth rate, literature shows that country's exports are dwindling whereas imports are going up. Low export volume implies that country's participation in international trade is comparatively low. This is however contributed by a country's less effort in enhancing integration (Mbekeani, 2007). For Kenya to become a middle income country by 2030 there is need for Kenya's products to become competitive in the foreign market. For Kenya to make necessary policies regarding international trade there is need for an intensive and comprehensive analysis of Kenya's economic competitiveness. This study therefore sought to investigate the impact of interaction between Kenya and selected lower middle income countries in SSA transport infrastructure, ICT infrastructure, energy infrastructure, water and sanitation infrastructure and distance of trading country from Kenya on her economic competitiveness. The author also included GDP, labour force and exchange rate as control variables as guided by empirical studies in the line of study. The selected lower middle income countries in SSA included Cameroon, Congo Republic, Ghana, Nigeria, Sudan and Zambia.

To achieve the intended objective, the study adopted panel regression. Pre-estimation tests and stationarity tests were carried out. Levin-Lin-Chu unit-root test was used to test for stationarity of the variables and revealed that all the variables were non stationary at levels except water and sanitation infrastructure which found to be stationary at level. In addition, to determine whether to adopt fixed effects framework or random effects framework, the study carried out Hausmann test. The probability value was less than 5 percent an indication that fixed effects framework was appropriate. Fixed effects model was estimated and the findings

showed that variables considered in the model are jointly significant in determining Kenya's export volume. Further, the results revealed that the coefficients of the first difference of GDP, transport infrastructure and energy infrastructure are positive and separately significant in influencing Kenya's export volume. Further the results revealed that the coefficient of the second difference of labour force is positive and statistically significant in influencing Kenya's export volume. These findings revealed that interaction between Kenya and selected lower middle income countries in SSA GDP, labour force, transport infrastructure and energy infrastructure are important in influencing country's export volume.

5.2 Policy Implications and Recommendation

The economic competitiveness of Kenya is thus evidenced to be a function GDP, labour force, transport infrastructure and energy infrastructure. The role of these Kenya's and lower middle income countries in SSA' characteristics is important for Kenya's economic competitiveness. Based on these results, there is need for Kenya to embrace integration especially with countries that have high GDP, high and quality labour force, high transport and energy infrastructure. Kenya should also heavily invest in transport infrastructure, energy infrastructure. Kenya should also put in place measures that will ensure economic growth and thus leading to employment her population. Some of these policies include ensuring political stability that will encourage both local and foreign investors that will create employment opportunities thus increasing economic growth.

5.3 Limitations and Further Areas of Research

This study concentrated on exploring the impact of Kenya and her counterpart lower middle income countries in SSA' infrastructure and control variables as guided by the literature on Kenya economic competitiveness. The emphasis of the study is on physical (also referred as hard infrastructure) and hence need to include soft infrastructure such as health, security and education in the model. Future studies can also incorporate more countries in SSA and beyond in the model when data on the indicated variables will be available.

APPENDIX 1: PROJECTS WITH PRIVATE SECTOR PARTICIPATION IN KENYA

Project name	Project status	Primary sector	Investment years	Govt Payment Commitments	Physical Assets	Total Investment
Iberafrica Power Ltd.	Active	Energy	1996-1996	0	64	64
Mombasa Barge-Mounted Power Project	Concluded	Energy	1996-1996	0	35	35
Mombasa Container Terminal	Cancelled	Transport	1996-1996	0	0	0
Jomo Kenyatta Airport Cargo Terminal	Active	Transport	1998-1998	0	21.4	21.4
Mombasa Grain Terminal	Active	Transport	1998-1998	0	32	32
Mombasa Grain Terminal	Active	Transport	2007-2007	0	15	15
Airtel Kenya	Active	Information and communication technology (ICT)	1999-2010	65	1512.8	1577.8
Airtel Kenya	Active	Information and communication technology (ICT)	2011-2014	0	259.2	259.2
Kipevu II	Active	Energy	1999-1999	0	85	85
Malindi water utility contract	Concluded	Water and sewerage	1999-1999	0	0	0
Ormat Olkaria III Geothermal Power Plant	Active	Energy	1999-2009	0	159	159
Ormat Olkaria III Geothermal Power Plant	Active	Energy	2011-2011	0	165	165
Safaricom	Active	Information and communication technology (ICT)	1999-2010	910	2027	2937
Safaricom	Active	Information and communication technology (ICT)	2011-2014	0	1263.1	1263.1
Essar Telecom Kenya (Yu)	Active	Information and communication technology (ICT)	2004-2004	27	75	102
Essar Telecom Kenya (Yu)	Active	Information and communication technology (ICT)	2008-2013	0	0	0
Aggreko Embakasi and Eldoret Power Stations	Active	Energy	2006-2006	0	23.7	23.7
Kenya Electricity Generating Company Limited	Active	Energy	2006-2006	108.8	0	108.8
Kenya Power and Lighting Company Management Contract	Concluded	Energy	2006-2006	0	0	0
Kenya-Uganda Railways	Distressed	Transport	2006-2006	4	400	404

Project name	Project status	Primary sector	Investment years	Govt Payment Commitments	Physical Assets	Total Investment
Telkom Kenya	Active	Information and communication technology (ICT)	2007-2010	400	76	476
Telkom Kenya	Active	Information and communication technology (ICT)	2011-2012	0	197.2	197.2
Telkom Kenya	Active	Information and communication technology (ICT)	2013-2014	0	0	0
Mumias Power Plant	Active	Energy	2008-2008	0	50	50
Rabai Power Plant	Active	Energy	2008-2008	0	155	155
Aggreko 140 MW temporary rental power plant	Active	Energy	2009-2009	0	22	22
Aggreko Westen Kenya Temporary Power Station	Active	Energy	2011-2011	0	4.7	4.7
Thika Thermal Power Project	Active	Energy	2012-2012	0	112	112
Triumph HFO Power Plant	Active	Energy	2012-2012	0	140	140
Aeolus - Ngong Wind Project	Active	Energy	2013-2013	0	171	171
Kwale Sugar plantation	Active	Energy	2013-2013	0	200	200
Aldwych Lake Turkana Wind Farm	Active	Energy	2014-2014	0	635	635
GEL Heavy Fuel Oil Fired Power Plant	Active	Energy	2014-2014	0	95.5	95.5

Source: World Bank, PPI data base for Kenya

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