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Thesis

Title: The impacts of physical infrastructure on FDI inflows in East African Sub-region, Africa and Europe

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Summary

The focus of this study is to explain the contribution of physical infrastructure in attracting foreign investments in East Africa by referring to Africa and Europe. Thus, the study has used FDI inflow data (total inflows and inflows in specific sectors) for the duration of 2006 – 2014 and seven different types of infrastructures namely road networks, railway and port services, air transportation, electricity supply, mobile telephone subscriptions and internet subscriptions in order to examine the contribution of physical infrastructure in attracting FDI in Europe, Africa and East Africa. The study is designed to test one of the most prominent theories of FDI – Eclectic theory (Dunning, 1988).

Therefore, the study employs panel data for FDI inflows in European, African and East African countries for nine consecutive years (2006 – 2014) to examine the trend of FDI inflows against development of infrastructures in control of pillars and sub-pillars of competitiveness as stipulated by Porter, et al, 2007. The study has applied appropriate tools such as Ms Excel, ArcToolbox of ArcMap, Gephi, Space Syntax and Stata for descriptive and inferential analyses. However, in order to link the study with global economic integration theory which is one of the theories underpinning the study; four variables have been generated for the purpose of this study. These are physical infrastructure index in presence of internet, physical infrastructure index in absence of internet, segment angular choice and segment angular integration. The last two were generated by using Acr Toolbox and Space Syntax; while the computation of others used the P2 distance index, a synthetic index that combined indicators of specific infrastructure into a single value.

The study has found that physical infrastructure stock is crucial for the inflow of FDI in European, African and East African countries because it facilitate smooth operations of business and maximizes profits as it reduces production costs. Moreover, it has been found that the maximum impact of physical infrastructure to space is exerted when the infrastructure reduces the distance from the specified space to all other spaces in the predefined radius. This phenomenon is well explained by using the impact of segment angular choice and segment angular integration to the inflow of FDI. Thus, effective infrastructure for FDI inflow is the one which facilitate the region to be highly connected (i.e. reduces distance to other places by increasing integration) and allow frequent passages (i.e. becomes the preferred route/ destination and become busier). In that case, the space attains locational advantage to attract more FDI than its competitors.

Keywords

Foreign direct investments, Competitiveness, Global economic integration and Physical infrastructure.

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Foreword

Foreign direct investment is currently considered as the engine of economic growth of the country. Most national governments are improving policies and business environments in order to attract inflows of FDI. One of their initiatives is construction of modern infrastructures which consume enormous share of their budgets. In this case, studies on FDI and its determinants are inevitable in order to add knowledge for decision makers to make informed decisions. Like many other literatures available, this study also advocates development of infrastructure as a strategy to attract foreign investments.

However, there is a proposition that infrastructures are more efficient when there is large market and stable economy. Thus, it is a piece of advice to decision makers that while spending on new infrastructure projects, there should be efforts to stabilize macroeconomic environments and form large markets through removal of trade barriers. This phenomenon signals a call for a shift of regional economic planning approaches from intra-regional economic planning to extra-regional economic planning.

Box 1: List of abbreviations

IHS	Institute for Housing and Urban Development
FDI	Foreign Direct Investments
GCI	Global Competitiveness Index
MNC	Multi National Corporation
MNE	Multi National Enterprises
UK	United Kingdom
US	United States of America
USD	United States Dollar
UNCTAD	United Nations Conference on Trade and Development
OECD	Organization for Economic Cooperation and Development
DED	District Executive Director
NFP	Netherlands Fellowship Programme

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Chapter 1: Introduction

This part establishes foundation of this thesis. The information is crucial because it explains why it important to research on the problem which is examined. It further states the main problem, research objective and questions of the study. Moreover, it includes significance and scope for the study in order to show its importance and pave a way for other scholars to study this theme.

1.1. Background of the Study

At present, FDI in the globe forms an important portion of private investment capital that stimulates economic growth (Dabour, 2000). For instance, for the past twenty years, global FDI inflows have grown about fourfold from USD 341.5 billion in 1995 to USD 1.23 trillion (UNCTAD, 2015). According to (Dabour, 2000), these inflows are directed to where opportunities abound and where returns are safely realized. Thus, there has been a growing competition among both developing and developed countries in creating friendly business environments in order to attract more FDI inflows; because FDI inflows are perceived as unprecedented opportunities for economic development of a country (Ghose, 2004) as the inflows are associated with crucial benefits to host countries to improve productivity by raising investment capital, stabilizing exchange rates, facilitating technology transfer and boosting entrepreneurial competition and penetration to external markets (Crespo & Fontoura, 2007; Romer, 1993).

Developing countries in Africa, Asia and Latin America and the Caribbean are highly in need of inward FDI in order to tackle the problem of insufficient savings for financing crucial governmental economic investments (Demirhan & Masca, 2008). However, factors which influence FDI inflows may vary from one locality to another (Porter, Sala-i-Martin, & Schwab, 2007; Dunning, Buckley, & Casson, 1992; Dunning & Lundan, 2008; De Mello Jr, Luiz R, 1997; E. Demirhan & Masca, 2008b; Dunning, 1988; Faeth, 2009; Fung, Garcia-Herrero, Iizaka, & Siu, 2005). These factors may be grouped into political, economic and social (United Nations, 1998). Prior to 1970s, FDI inflows to most developing countries were hampered by economic policies adopted after independence in 1950s and 1960s which imposed restrictions on trade and control over the capital as were skeptical to free trade and foreign investments (Rodrik, 1998). Therefore, most of these countries had to improve this hostile business environment through economic reforms in order to convince MNEs to start investing in these countries as (Voulgaris, Asteriou, & Agiomirgianakis, 2003; Zvirgzde, Schiller, & Diez, 2013) proposes that FDI inflows to a country is influenced by the behaviour of MNCs; therefore factors affecting behaviour of MNCs are likely to influence the volume and destinations of FDI. At present, many developing countries have implemented such reforms in order to shift from inward-looking development strategy i.e. import substitution industrialization towards outward-looking development strategy i.e. export promotion industrialization (Bakoup, 2013).

In order to facilitate these reforms, public investments on extensive and efficient physical infrastructure have taken a central role in most countries. At present, by average African countries invest 5% to 7% of their GDP in physical infrastructure development (Infrastructure Consortium for Africa, 2014); in 2013 such amount formed 46.9% of USD 99,599 million which was total infrastructure investment as the remaining 53.1% was secured from external sources (Infrastructure Consortium for Africa, 2014). The idea lays on the contribution of physical infrastructure in facilitating business operations. It is argued that inadequate

infrastructure deters both domestic and foreign investments because it impedes investment efficiency by increasing production costs or delaying movements of materials, capital and information hence slowing down productivity (Porter et al., 2007; Dunning et al., 1992; Asiedu, 2002; Asiedu, 2006). However, prior to 2000, the success of developing countries from their efforts to attract FDI inflows was meager because the inflows of FDI in developed countries remained massive, approximately above 80% of global inflows (Shenkar, 2007).

The efforts of developing countries started to show impacts in after the year 2000 when FDI inflows started going up enormously. According to UNCTAD (2015) the most significant growth of FDI inflows is from USD 232.2 billion (17%) in 2000 to USD 681.4 billion (55%) in 2014. For the first time, developing countries FDI inflows share surpassed that of developed countries. However, 40% of total inflows to developing countries flow to countries like China, Brazil, Mexico, and India with emerging economies (UNCTAD, 2015). Africa FDI inflows are also getting bigger in absolute terms, however in relative terms are characterized by stagnancy and sluggishness. According to UNCTAD (2015), Africa's FDI inflows have shown sluggish growth from USD 9.6 Billion in 2000 to USD 54.0 Billion in 2014 compared to USD 142.8 Billion to USD 465.3 Billion and USD 79.6 Billion to USD 159.4 Billion for Asia and Latin America and the Caribbean respectively. Nevertheless, for the year 2014 the main FDI inflows recipient sub-region was West Africa (12.8 USD Billion), followed by Central Africa (12.1 USD Billion), North Africa (11.5 USD Billion), Southern Africa (10.8 USD Billion) and lastly Eastern Africa (6.8 USD Billion) (UNCTAD, 2015).

According to AfDB (2013) East Africa physical infrastructure lags behind other African geographical sub-regions. East Africa's surface transportation performance is worst in the world; while in terms of electric power the problem is not only lower generation but also lowest access in comparison to other sub-regions. On the other hand, adoption and implementation of economic reforms have been substantial (Daniel, 2010). At present, most East African political, economic and social status are reasonably similar to other African countries in other sub-regions; however there is a evident disparity between the volume of FDI inflows in East Africa region and others. In 2014, the sub-region FDI inflow was USD 6.8 billion only and trailing behind Southern Africa USD 10.8 billion, North Africa USD 11.5 billion, Central Africa USD12.1 billion and the leader West Africa with USD 12.8 billion (UNCTAD, 2015).

Therefore, this study aims to understand the relationship between physical infrastructure and FDI inflows in East Africa sub-region provided that other factors remain constant.

1.2 Research problem

East African countries like other developing countries need foreign capital in forms of either direct or indirect investments because of their insufficient national savings for financing their investments (Demirhan and Masca, 2008). The drying up of commercial banks in 1980s has necessitated these countries to rely on FDI as the best way to acquire foreign capital (ibid). Like other African countries, East African countries started to create friendly environments for businesses in order to attract FDI inflows in the 1980s and 1990s. According to the financial advice by the World Bank and IMF during debt crises, the economic reforms were associated with de-regulation, free markets, and privatization; and public investments on modern physical infrastructure such as transport networks and telecommunication services.

Despite the fact that Africa's FDI inflows have remained meager as compared to other comparable regions, East Africa lags behind among all Africa's geographic sub-region. Although there is no consensus on the determinants of FDI, most scholars converge when studies are for developing countries, African countries inclusive. It is argued that one of the main determinants is quality of infrastructure in the host country. Thus, the main problem of this study is not only low FDI inflows in East Africa as compared to other African sub-regions (UNCTAD, 2015) but also its inadequacy in physical infrastructure, which lags behind most African and Western countries (UNCTAD, 2015; Porter et al., 2007). The trend of inward FDI in East Africa shows that the region has experienced the increase by 11% to USD 6.8 billion from 2010 to 2014; despite remaining the lowest figure flowing in African regions (UNCTAD, 2015).

1.3. Research objectives

1.3.1. Main Objective

The main objective of this study is to add impactful knowledge about FDI to the already existing literature, by explaining the role of physical infrastructure as one of the determinants of FDI inflows in East Africa, Africa, and Europe.

1.3.2. Specific Objectives

- To compare between Africa and Europe the contribution of physical infrastructure in attracting FDI inflows.
- To explain the impact of physical infrastructure on FDI inflows in East Africa.

1.4. Research questions

1.4.1. Research questions

Is physical infrastructure crucial determinant for FDI inflows in East Africa, Africa, and Europe?

1.4.2. Research Sub-questions

- What is the contribution of adequate transportation network in attracting:-
  - Overall FDI inflows in Africa and Europe?
  - Overall FDI inflows in East Africa region?
- What is the impact of cumulative physical infrastructure stock on:-
  - FDI inflows in Africa and Europe?
  - FDI inflows in East Africa region?
- To what extent does the specific physical infrastructure influence:-
  - Overall FDI inflows in Africa and Europe?
  - Different sectors of FDI inflows in East Africa?

1.5. Significance of the Study

The fact that FDI inflow at present is the most preferred source of foreign capital in East African countries; create an eagerness to dig more about FDI determinants as an answer for why other places receive more FDI and hence economically prosper while others receive low and hence economically lag behind. This study will contribute to the existing literature explaining the relationship between physical infrastructure and FDI inflows in developing countries. In doing so, the study aims to find out the relevance of Eclectic theory (Dunning,

1988) and Regional Economic Integration theory (Balassa, 1994) in East Africa; as a way to add knowledge in order to assist in making an informed decision within the public and private sectors.

1.6. Scope and Limitations

This study focuses on examining the influence of physical infrastructure in attracting FDI inflow in East African countries, with reference to a comparison between Africa and Western Europe. The analysis will rely on competitiveness factors, in which physical infrastructure is inclusive. In this study, East Africa is represented by five countries namely Burundi, Kenya, Tanzania, Rwanda and Uganda; the sixth member South Sudan is not included due to lack of data. Moreover, analysis for Africa will rely on 39 countries whose data are available. In order to get valid findings, the analysis will be carried for the duration of 2006 – 2014 by using panel data.

1.7. Structure of the thesis

This thesis comprises five chapters. The content for each chapter is described below;


Chapter 1
Research topic
Problem statement
Problem statement
Main objective
Research question
Specific research question
Significance of the study
Scope and limitation
Chapter 2
Literature review (Theories and concepts)
Conceptual Framework
Chapter 3
Operationalization of variables
Research strategy
Sample size and sampling method
Data collection instruments
Methods for data analysis
Chapter 4
Data analysis
Findings
Interpretation
Chapter 5
Discussion
Conclusion
Recommendation

Chapter 2: Literature Review / Theory

This chapter provides a synopsis of existing literature (theories and main concepts) in fundamental areas of the study. The arguments are based on main factors for FDI inflows and contribution of physical infrastructure in attracting FDI inflow in East Africa. There is empirical evidence which proposes that availability, quality, and adequacy of infrastructure improves competitive advantages of a particular country and hence influences location decisions of investors seeking investment destinations. In this study, the key concepts are FDI, regional competitiveness, physical infrastructure and global economic integration.

2.1 Theoretical Framework of the study

There is no unique theory which can explain fully the phenomenon of FDI inflows to the host country because the flows are influenced by a number of motives. According to Dunning (2000), there are four main motives of FDI inflows; namely availability of resources (resource-seeking), the presence of promising market (market-seeking), utilizing advantages of economies of scales (efficiency-seeking) and enhancing firm's global competitiveness (strategic asset-seeking). Therefore, there are a number of theories which try to explain the phenomenon of FDI inflows in the world; however neither of them can fully explain all causes of FDI inflows. These theories can mainly be grouped into classical and neo-classical. However, this study is underpinned by the Eclectic theory by Dunning (1988) and the Economic integration theory by Competitiveness theory by Porter, et al. (2007).

2.1.1 The Eclectic Theory

This theory was developed by John Dunning (1988). The theory explains the causes of FDI inflows by using a three-tiered framework called OLI Paradigm by deducing that there are three factors which facilitate and determine FDI inflows; namely ownership advantages, location advantages, and internalization advantages.

According to Xin-Zhong (2005), ownership advantages are referred to as features that are firm-specific which ensure the firm enjoys and exploits market power advantages in the host country. These features provide comparative advantage to the foreign firm to compete in host country against indigenous firms. Ownership advantages encompass skills which can be applied in different places while maintaining its standard and can easily be licensed or imparted to daughter firms at low costs. The common examples are production technology, business skills, brand name, patent, and reputation.

Location advantages are referred to as features that facilitate firm's business operations and growth in the host country (ibid). These features create conducive environments for a foreign firm to gain maximum profit from its business and operations. Location advantages include all factors which facilitate production processes of the investor close to final consumers in the manner which saves transport costs, enhance the availability of cheap inputs, and provide affordable communication services from demand and supply sites. Such factors are like availability of natural resources, physical infrastructure, labor, markets, friendly economic conditions and strategic location to penetrate external markets.

Internalization advantages are referred to as decision of the international firm to directly invest in multiple countries abroad in order to create markets for its products (Shenkar, 2007). Therefore, internalization theory involves market internalization which implies that the MNE directly invests in multiple countries abroad in order to create internal markets for its

intermediate products within those countries (ibid). This is done when a firm finds that it is more favorable for it to access foreign consumers itself rather than contracting out to a foreign company (Xin-Zhong, 2005).

According to Dunning et al., 1992; Dunning & Narula, 1996; Dunning & Lundan, 2008; Ajitabh & Momaya, 2004; Dunning, 1988; physical infrastructure is among the crucial location determinants which affect the patterns of FDI. Therefore, availability of efficient physical infrastructure in the region, country or city affect its location advantage positively i.e. makes the region more suitable for investments as business operations are more likely to be efficient than in a region which lacks the same. In this regard, the differences in FDI inflows between two regions are accounted by among other factors their differences in physical infrastructure existing between the two regions.

2.1.2 The Economic Integration theory

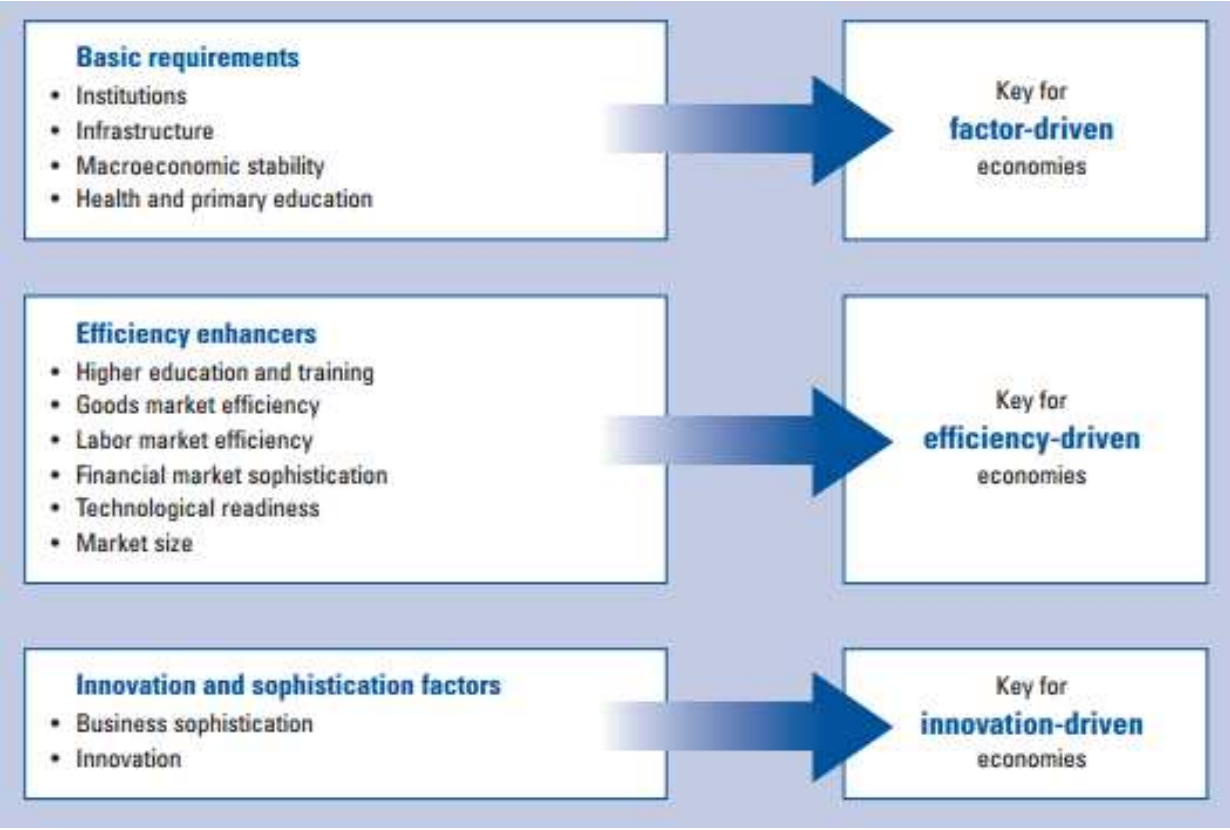
The concept of global economic integration is the derivative of economic integration. Global economic integration is crucial for improving the welfare of the world as it lowers costs of goods and services. It is argued that the theory of economic integration is based on the work of Viner (1950), Meade (1955) and Lipsey (1957). According to Shenkar (2007); the theory explains the economic benefits of integration as the result of the growth of cross-border trade and position of the region or city in the global network because of the location ability to produce or buy. Thus, global economic integration is facilitated by cross-border movements of factors of production as the designed mechanism to avoid trade and payments barriers, state interference in business, mitigating cyclical fluctuations and stimulating enlargement of national earnings (ibid).

In this regard, nations or cities which enjoy more from global economic integration are considered to be the most competitive as compared to others. At present, the most competitive cities in the world are London, New York, Shanghai, Hong Kong and Singapore. The competitiveness[1] of the place is determined by its level of sustainable productivity which is facilitated by its policies, institutions and production gears. This set of competitiveness has been elaborated further by Porter, et al. (2007).

According to Porter et al. (2007); there is Global Competitiveness Index of States which has been derived from 12 pillars of competitiveness. These 12 pillars as presented in Figure 1 below affect the performance of regional economy by determining the ability of the region to uphold high incomes to its citizens and profit making to investment inflows (ibid). One of these pillars is physical infrastructure. Availability of adequate physical infrastructure is regarded as a critical factor for competitiveness (ibid). Other critical factors are the quality of institutions, macroeconomic condition and community health and primary education, higher education and training; goods market efficiency, labor market efficiency, financial market sophistication, technological readiness, market size, business sophistication and innovation (ibid). It is emphasized that availability of extensive and efficient physical infrastructure determines the set of economic production processes and related businesses which all together stimulate economic development (ibid).

[1] Murths & Lenway (1998) define competitiveness as the economic potency of one region when compared to its rivals in the same market where cross-border movements of commodities, information, capital, technology and labor are not restricted.

Figure 1: 12 Pillars of Competitiveness



Source: (Porter et al., 2007).

One of the main roles of physical infrastructure is to facilitate linkages in global networks. This is a spatial connection of global enterprises' economic activities and consumption processes. Therefore, efficient physical infrastructure raises the level of competitiveness of the region by facilitating connectivity between two distant points and improve accessibility hence contribute towards reduction of poverty and income generating activities (Porter et al., 2007).

2.2 The Concept of Global Economic Integration and Networks of Cities

The term Economic Integration refers to a step by step elimination of barriers for economic interactions among different economies/ countries in order to facilitate free movements of forces of production (capital, labor, technology, business skills, etc.) for the purpose of expanding markets for commodities and labor and investment/ business opportunities (Shenkar, 2007; Mwenya, 2013; Samaratunga & Weerasinghe, 2002). One of the economic importances of the process of economic integration is to enhance global equilibrium between economic productions and employment opportunities as the latter are highly affected by the growth of technology, especially technologies which cut down the demand for human labor in production processes. Thus, this trend has necessitated the formation of regional economic blocks and finally advocacy of global economic integration in order to allow free movements of factors of productions to areas where they are not only more economic profitable but also can provide more social benefits for the betterment of the world (Shenkar, 2007). As the results of this, the world has witnessed de-industrialization in developed countries and its

opposite in developing countries; hence stabilization and fast growth of some economies like China, Singapore, and Brazil.

Figure 2: Stages of the process of economic integration

Source: Author, 2016 based on Balassa (1994).

The prosperity of global economic integration has led to the development of networks among cities. The recent trend shows that the more the city is networked (connected and integrated), the fast the growth of its economy, this is because it is these networks which facilitate the movements of factors of productions including FDI.

2.2.1 The Synopsis of FDI inflows

The brisk pace of economic growth in many countries is impeded by low productivity which is caused by insufficient capital for investment and problems in production technology. The capital for economic investment and development in a country is categorized into domestic when accumulated within a country and foreign when accrued from abroad either through aids or investments. There are two types of foreign capital: namely aids which flow in the form of grants and loans; and investments which flow in form portfolios and direct investments (Moosa, 2016). Since economies of most developing countries cannot address effectively the existing economic challenges such as financial gaps, foreign capital has become an important source to complement the gaps related to savings, trade and technology. At present, access to other foreign sources of finance such as loans and grants is dwindling hence FDI inflows become the most preferred source of foreign capital because *inter alia* other reasons it is debt free thus all risks are upon the investor (E. Asiedu, 2004; Moosa, 2016). The entry mode of FDI inflows in host economies is through either Greenfield investments or Mergers and Acquisition (M&A). Greenfield investment occurs when a firm single-handedly (as sole owner) or jointly with another firm (in a joint venture) builds brand-new facilities from scratch in a host country while Merger and Acquisition occurs when a firm buys a portion (partial acquisition) or entire ownership (complete acquisition) of a target firm in a host country (Shenkar, 2007).

According to Organisation for Economic Co-operation and Development, 2009 p.17 FDI is defined as;
''A category of cross-border investment made by a resident in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor''.

Further elaboration can be cited from Moosa (2016) description that *"FDI is the process whereby residents from another country (source country) acquire ownership of assets for the purpose of controlling the production, distribution and other activities of a firm in another country (the host country)"*.

According to Moosa (2016) the definition of FDI has to clearly include the intention to control business through some discretionary decision-making powers and show the lasting interest since is long term project. This gives the investor considerable powers in the

management of the enterprise in a foreign country. Such investment involves both the initial transaction between the two entities and all subsequent transaction between them among foreign affiliates, both incorporated and unincorporated.

Therefore, FDI inflows have the following features:-

- The investor has to be a foreigner investing in another country
- The investment can be through establishing a subsidiary, affiliate or purchase, and control of another domestic company.
- The primary motive has to be profit making.
- The foreign investor has to seek control over investment and management.
- The investment assets can be sent back to source country

Therefore, for the purpose of this study FDI inflow is defined as the movement of production capital from one country (source) to another country (host) in order to operate and control business for the purpose of maximizing profit.

2.2.2 The Foundation and Growth of FDI

The history of FDI can be traced back from the 1890s during the industrial revolution[2]. Godley (1999) argues that the emergence of Singer Manufacturing Company in the United Kingdom as the first MNC was due to its focus on FDI while the collapse of many others was due to their failure to focus on FDI. This argument gives the light behind the economic prosperity of United Kingdom as the world major creditor by then, a status which was seized by the United States after the Second World War (ibid). However, prior to 1950s, FDI was considered as a form of portfolio, as the main reason for its flow was differences in interest rates (Nayak & Choudhury, 2014), and its movement involved only capital (Kindleberger, 1969). Thus, FDI inflow causes were theoretically explained by interest rate theory which proposes that in the presence of uncertainties and risks, financial resources tend to flow to the regions with possible highest return (ibid). Thus, the theory of interest rates was enough to justify capital flows from one country to another for the purpose of making profits.

In the end of the 20th century, studies and researches on FDI inflows started to gain global interests. There are several known reasons which motivated these studies. The first one is the rapid growth of FDI inflows and change in its pattern since the 1950s (Jeon, 1992; Moore, 1993). Nayak & Choudhury (2014) submits that advanced transport technology that facilitated business control from a distance, the requirement of investment capital from the United States by European countries and Japan to fund their restoration activities after World War II and globalization forces were the reasons which led not only to growth but also molding of FDI inflows after World War II. The second motivation is the growing trend of FDI inflows after the debt crisis[3] in the 1980s. There is empirical evidence that FDI inflows have not only become an alternative source of foreign capital for developing countries but also has been growing even when world trade slows down; hence some optimists regard it as a strategy to circumvent trade barriers (Jeon, 1992; Moore, 1993). The third reason for motivating to study FDI inflows is the concern about the causes and consequences of foreign

[2] Industrial revolution refers to unprecedented technological and economic development that began during the 18C in UK and spread in varying degrees to the rest of Europe, US and Japan.

[3] Debt crisis is the situation which faces the state's government when its external debt to foreign banks and foreign countries grows massively to become unserviceable to the extent of starting to threaten the stability of the government.

ownership which may lead to loss of sovereignty and compromise over national security (ibid). There are deviating views that FDI inflow symbolizes new colonialism and FDI inflow is important for economic development of developing countries (ibid). The last motivation is related to arguments that FDI inflows provides the possibility for capital growth to developing countries and play a significant role in transforming former communist countries (ibid).

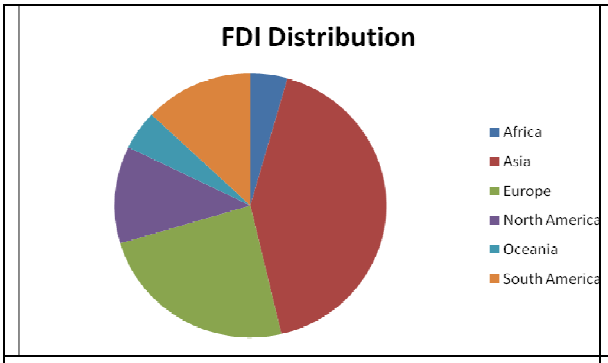
One of the pioneering studies was that of Hymer (1976) which did put forward the shortfalls of applying interest rate theory to explain FDI. Hymer argues that interest rate theory does not effectively address causes of FDI inflows because the theory does not cover the issue of enterprise's control which is necessary for FDI inflows (Nayak & Choudhury, 2014). This critic triggered the beginning of more studies trying to efficiently explain the theoretical sense on the causes of FDI inflows, whereby until today despite ample literature available there is no common agreed theory which underpins the explanation of all causes of FDI inflows despite presence of good number of FDI theories. According to (Nayak & Choudhury, 2014), these theories can be grouped depending on the factors of perfect competition, imperfect market, monopolistic and oligopolistic advantages, and cross-border trade. However, Dunning & Narula, 1996; Dunning & Lundan, 2008 submits that theories of FDI can be classified basing on FDI motives which are resource-seeking, market-seeking, efficiency-seeking and strategic asset seeking. Basing on Dunning's classification, most scholars argue that FDI inflows in developing countries are mainly resource-seeking and market-seeking (Asiedu, 2002; Khadaroo & Seetanah, 2009; Dunning et al., 1992; Dunning & Lundan, 2008).

2.2.3 The Trend of FDI networks in the World

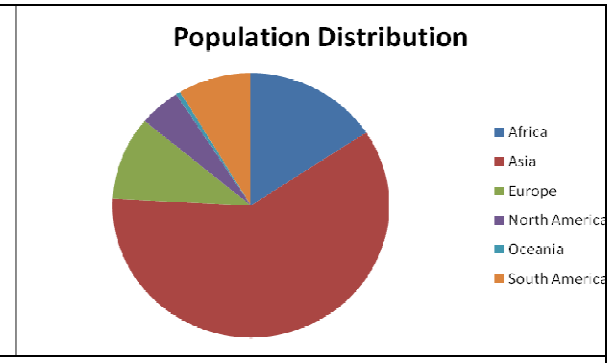
At present, global FDI inflows form an important portion of private investment capital that stimulates economic growth in the world (Dabour, 2000); thus all countries from the developing and developed world need FDI inflows for their economic development (Demirhan & Masca, 2008). For the past twenty years, global FDI inflows have gone up about fourfold from USD 341.5 billion in 1995 to USD 1.23 trillion in 2014 (UNCTAD, 2015).The most highest peaks recorded ever are USD 1.36 trillion in 2000 and USD 1.87 trillion in 2007 (ibid). According to UNCTAD (2015), in 2014 the main sectors for FDI inflows were services (63%), manufacturing (26%), extraction (7%) and unspecified (4%).

Since FDI inflows are motivated by profit opportunities, their destinations have been uneven leading to exclusion of some parts of the world from MNE's operations (R. S. Wall & Van der Knaap, 2011; R. Wall, Burger, & Knaap, G. A. (Bert) van der, 2011). Thus, it is deduced that the existing developmental disparities among regions, countries and cities in the world are due to their differences in agglomeration with MNE activities as the result of FDI inflows. Moreover, these skewed concentrations of FDI inflows to host countries have led to social polarization due to development gap within the same country, especially in vast countries. Therefore, the development gap existing between industrialized countries and less developed countries is explained by their differences in FDI inflows and will be reduced by the same. According to Ghose (2004), it is proposed that FDI inflows leads to a portion of savings from the rich countries to be invested in poor countries hence the decline of the saving rate in rich countries beneath their previous saving rates meanwhile increase the saving rates of poor countries over their previous saving rate hence improvement in productivity and economic development. At present, there is ample evidence that justifies the relationship between FDI inflows and economic development of the region.

Chart 1: Global share of FDI inflow and population distribution by continent



Source: (UNCTAD, 2014)



Source: 2014 World population data sheet.

For instance, the analytical studies uncover that all countries in Asia and Latin America whose economies became stable in the 1990s were destinations of noteworthy FDI flows while some European countries which showed slow economic growth rates experienced stagnating or dwindling inflows of FDI (Ghose, 2004). Therefore, most economists perceive FDI inflows as unprecedented opportunities for economic development of a country (Ghose, 2004) because inflows of FDI to host countries generate economic benefits by raising investment capital, stabilizing exchange rates, facilitating technology transfer and boost entrepreneurial competition and penetration to external markets (Crespo & Fontoura, 2007; Romer, 1993).

2.1.2 The FDI inflow networks in Europe and Africa

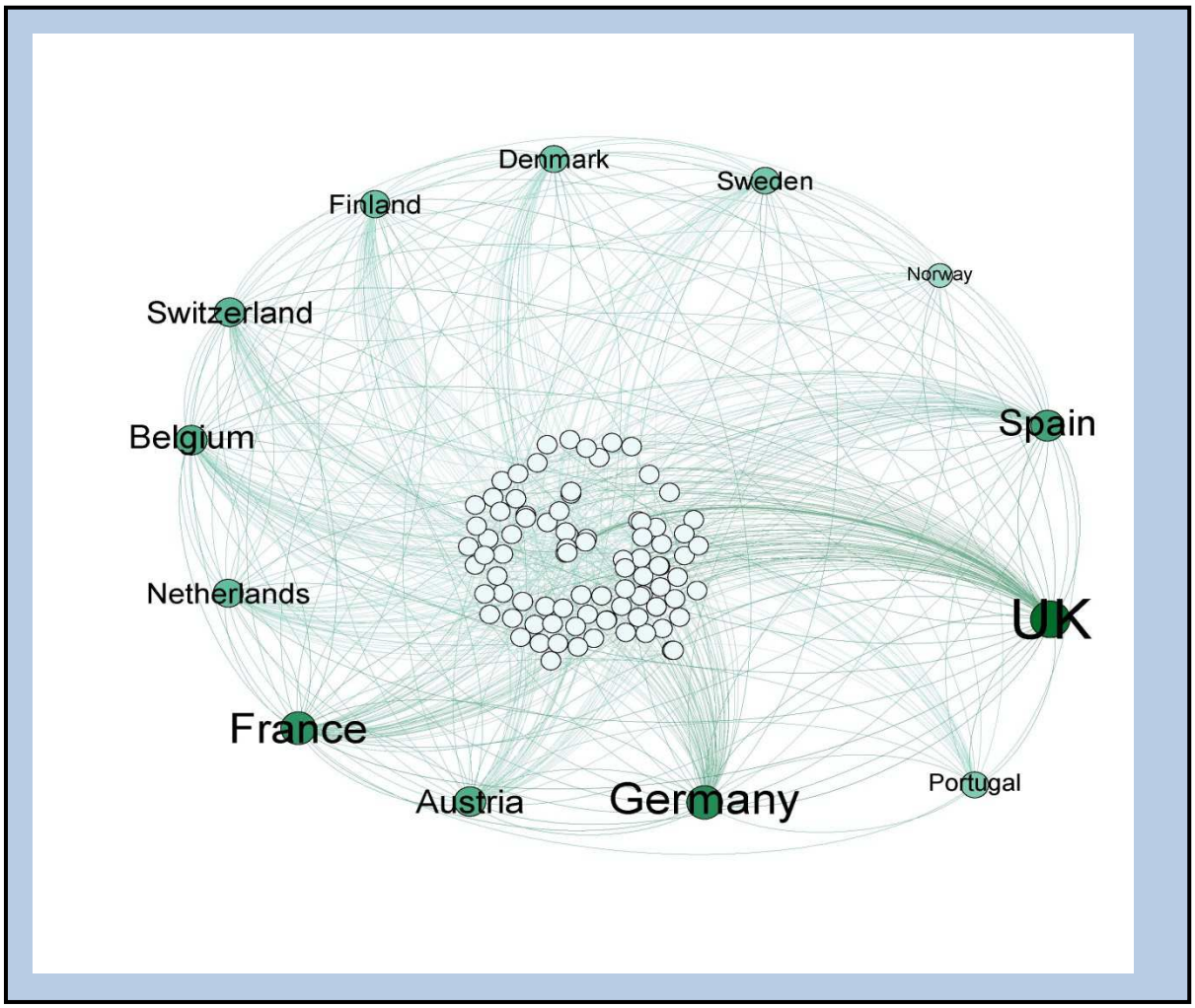
According to Shenkar, 2007; Mwenya, 2013; Samaratunga & Weerasinghe, 2002; the contribution of physical infrastructure to inflow of FDI in host countries is mainly in facilitating smooth movements of forces of production (capital, labour, technology, business skill, etc) and raw materials to industrial sites and products to market sites timely and efficiently. Therefore, efficient infrastructure for attracting FDI inflow is the one whose quality provides competitive location advantage to the region when compared to its neighbours. It has been pointed out that one of the reasons which facilitated the growth of FDI in the 20th century was advancement in transportation technology which facilitated business control from a distance. To date, some of the MNCs operate businesses in different parts of the world from their headquarters located in New York, London, etc, without problems because it is possible to transfer all factors of production within a short period of time from their headquarters to areas of productions.

In that case, in order for the region to attract MNCs operations it has to establish transportation and communication systems which allow the MNCs to operate their businesses from a distance. This ability gives the host region locational advantage against its competitors, and as these investments from MNCs grow its advantage increases against nearby regions as it block inflows to its neighbours. In network analysis, this advantage is referred to as betweeness centrality/choice. It is the measure of flows as the result of being the preferred selection out of many other alternatives. Thus, a region with higher number of flows is regarded as preferred selection due to its location is the system. In the other hand, for a region which is lack locational advantages; where MNCs operations stagnate or decline, it is referred to as a place with low integration. In network analysis, this condition is caused by the state of the region being excluded from the preferred selections due to its location being

distant graphically. Thus, a region with low number of flows is regarded as distant space due to lower degree of integration.

This argument is emphasized by analysis of networks of FDI markets data for 2006 – 2014 by using Gephi software as indicated in figure 4 and 5 below.

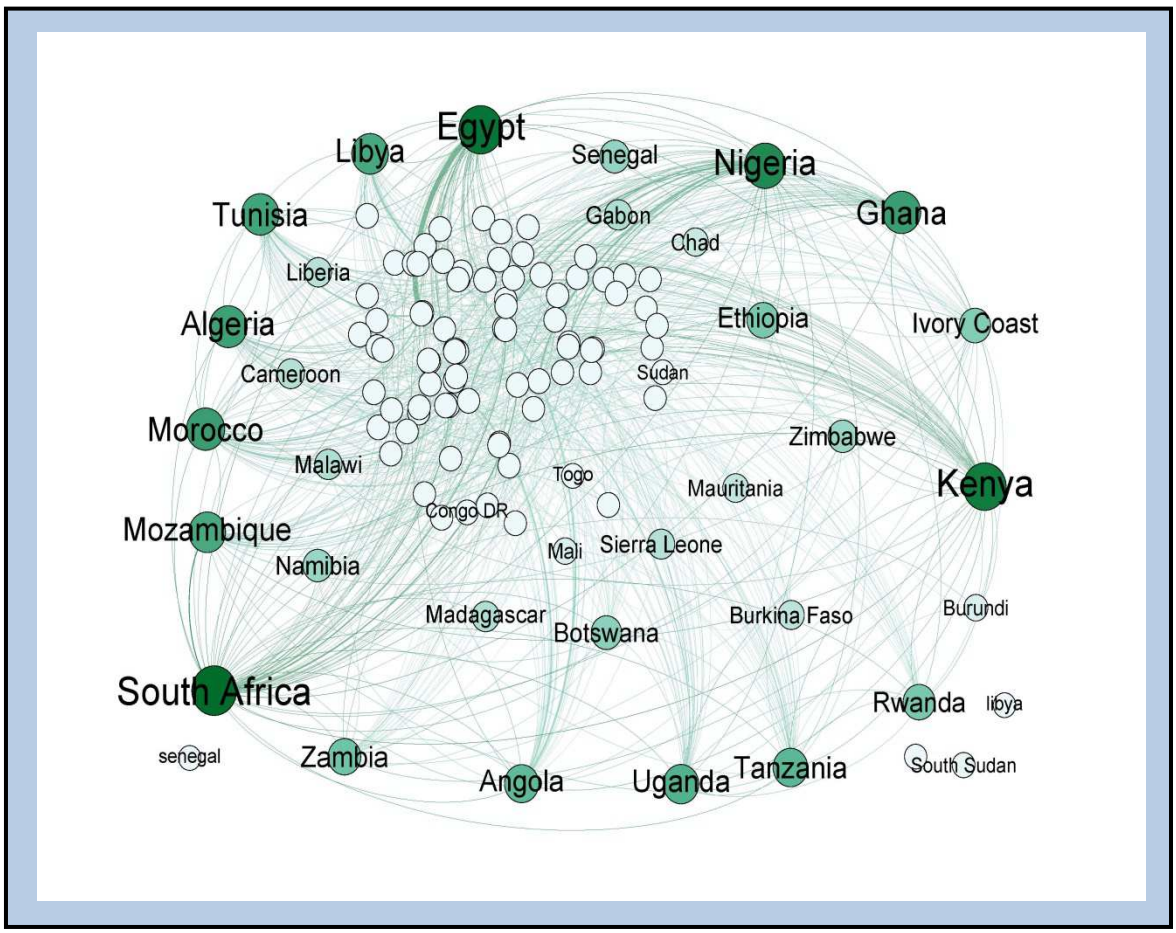
Figure 3: FDI Networks in European countries



Source: Author, 2016 based on FDI markets.com (2006 – 2014) & Gephi software

The message from the visualization of networks (Figure 4 and 5) suggest that cross-border investments have formed global networks which are facilitated by choices and integration basing on location of the space with respect to existing transportation and communication networks. Therefore, availability of these services and location with respect to flows are vital for attracting investments in the particular region.

Figure 4: FDI Networks in African countries



Source: Author, 2016 based on FDI markets.com (2006 – 2014) & Gephi software

2.2.3.1 FDI inflows in Developed and developing Countries

Prior to 1950s Japan, United States and some countries in Europe had already started enjoying the benefits of FDI inflows in the form portfolios (Nayak & Choudhury, 2014). Thus, the developed world continued to be the favored destinations of FDI inflows until the end of the 20th century because according to (Shenkar, 2007) prior to 2000s their global share of FDI inflows remained massive. According to (UNCTAD, 2015), the FDI inflows in developed countries have dropped heavily from 82.5% in 2000 to 40.6% 2014. Although developed world remains the most beneficiary of FDI inflows, the current global rise of FDI inflows does not favor developed world. The main sectors for FDI inflows are service and manufacturing.

In most developing countries the thoughts for FDI inflows began to be considered during the debt crises in the 1980s as a response to economic advice provided by World Bank and IMF (Ghose, 2004). It is argued that the debt crises in the 1980s necessitated most of the poor countries to comply with this advice as there were no other reliable means to acquire foreign capital for their development investments (Mottaleb & Kalirajan, 2010; Demirhan & Masca, 2008). The central theme of the advice by World Bank and IMF to developing countries was a reformation of their economies in order to create business-friendly environments that will attract international investments (Ghose, 2004). Such reforms have been implemented

through de-regulation, trade liberalization, and privatization as well as considerable motivations to foreign investors through tax concessions or subvention (Mottaleb & Kalirajan, 2010; Demirhan & Masca, 2008).

These interventions started to show impacts in the 2000s when FDI inflows in some developing countries started growing. The remarkable impact was in 2014 when for the first time the inflows of FDI in developing countries outpaced those into developed countries. This phenomenon matches with the explanation of the market-seeking theory of FDI which proposes that external large and stable markets give an extra market opportunity for products of industrialized countries to expand their sales hence more profits, thus deducing market size as one of the pulling factors of FDI inflows. According to UNCTAD (2015), the FDI inflows in developing world grew significantly from 15.9% in 2000 to 55.4% in 2014 of the global inflows. This growth has been the result of changes in perception towards FDI inflows to most developing countries by considering FDI inflows as not only sources of foreign capital and foreign exchange but also dynamic and competent gear that facilitate gaining from production technology, business management skills, entrepreneurial expertise and supply and consumer networks for economic productivity, employment opportunities, and trade growth. The main sectors for FDI inflows are service, manufacturing, and primary.

2.2.3.2 FDI inflows in Africa

African economy lags behind other developing countries due to *inter alia* insufficient savings to finance crucial economic investments. Therefore, FDI inflows in Africa are essential to fill the gap between domestic savings and finance productive investments for economic development. Thus, like other developing countries, African countries have been not only implementing economic reforms but also improving other determining factors such as physical infrastructure in order to create conducive environments for businesses and hence FDI inflows. These initiatives have started showing positive signs though at very slow pace, hence causing Africa's inflows to remain meagre as compared to other comparable regions such as Asia and Latin America and the Caribbean.

According to UNCTAD (2015), Africa's FDI inflows started to go up massively in the last decade of the 20th century when it rose from USD 2.9 billion in 1990 to USD 5.7 billion in 1995 and to USD 9.6 billion in 2000. The growth has been more significant in the 21st century where it is shown that Africa's FDI inflows have grown up from USD 9.6 billion in 2000 to USD 54.0 in 2014. At present, despite abundant natural resources and population size, Africa receives only 4.4% of the global FDI inflows making it the least recipient among all other regions. According to 2014 FDI inflows data, Africa is preceded by Asia 41.9%, Europe 24.0%, South America 12.9%, North America 11.9% and Oceania 4.8% (UNCTAD, 2015). It is argued that the inflows of FDI in Africa are mainly motivated by availability resources (natural resources and labor), market size and strategic locations for business (Asiedu, 2002; Asiedu, 2006; Bende-Nabende, 2002; Khadaroo & Seetanah, 2009). According to World Investment Report (2015), the leading sectors in receiving FDI inflows are service (48%), extraction (31%), manufacturing (21%) and unspecified (1%).

2.2.3.3 FDI inflows in East Africa

In this context, the referred East Africa sub-region is in accordance with the (UNCTAD, 2015) description which is comprised of 12 countries: namely Comoro, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Mayotte, Seychelles, Somalia, Uganda, and Tanzania. In Africa, this sub-region trails behind all other four sub-regions in receiving FDI

inflows despite its abundant investment opportunities (Daniel, 2010). The 2014 FDI inflow data show that West Africa is leading by receiving USD 12.8 billion, followed by Central Africa USD12.1 billion, North Africa USD 11.5 billion, Southern Africa USD 10.8 billion and lastly East Africa which receives USD 6.8 billion (UNCTAD, 2015). However, the overall FDI inflows have been increasing like in most other developing countries. For example, the average inflows of USD 3.3 billion for the period of 1995 – 1999 increased significantly to USD 5.5 billion during the period of 2000 – 2014 (ibid).

Moreover, the average FDI inflows by countries for the period of 2010 – 2014 show Tanzania as the largest recipient and Comoros the least. According to (UNCTAD, 2015) the order is as follows that Tanzania (USD 1.8 billion), Uganda (USD 977.2 million), Madagascar (USD 669.6 million), Ethiopia (USD 669.3 million), Kenya (USD 453.2 billion), Mauritius (USD 425.9 million), Seychelles (USD 215.5 million), Djibouti (USD 132.9 million), Somalia (USD 106.8 million), Eritrea (USD 52.3 million), Comoros (USD 13.1 million) and no records for Mayotte. Like any other developing countries, the inflows of FDI in East Africa are mainly motivated by the availability of resources, market size and strategic location for business (Asiedu, 2002; Bende-Nabende, 2002). However, conducive environment for business in the sub-region is of great importance as it does not only attract FDI inflows but also facilitate investment operations hence expansion of the share of FDI inflows in the regional economy. At present, the main sectors which receive FDI are service 45%, extraction 35% and manufacturing 20%.

Scholars argue that inadequate infrastructure deters both domestic and foreign investments because it impedes business operations by increasing production costs or delaying movements of materials, capital and information hence slowing down productivity (Dunning, 1988; Porter et al., 2007; Castro, 2008; Demirhan & Masca, 2008; Faeth, 2009). According to AfDB (2013); East Africa infrastructure lags behind other African sub-region; moreover the sub-region is the least urbanized which is experiencing not only highest rate of urbanization but also fastest population growth as compared to other sub-regions in Africa (UN-Habitat, 2014), hence efforts to create income generating opportunities for governments, individuals or MNEs through FDI inflows are of great concern. In 2014, the sub-region inflows increased by 11% to USD 6.8 billion which was 12.6% of FDI inflows in Africa (UNCTAD, 2015).

Like other countries in Africa with varieties of resources, East African countries are endowed with natural resources that can attract FDI inflows in different sectors like agriculture, mining, tourism and energy (Daniel, 2010). At present, the economies of all East African countries are factor-driven as are based on factor endowments; hence their competitiveness for FDI inflows is literally maintained by the performance of available institutions, adequate infrastructures, macroeconomic stability and a healthy and educated labor (World Bank, 2015). Lack of consensus among scholars on the determinants of FDI inflows necessitates this study in order to explain the phenomenon of FDI inflows in East Africa, Africa and Europe in general.

2.2.4 The Positive effects of FDI inflows in Developing countries

The phenomenon of FDI inflows in developing countries advocated as the catalyst for economic development because it enlarges financial capital in the business, create income generating opportunities, improve human capabilities, skills, and production technology, increase trade opportunities, contribute to the advancement of products standard, facilitate economic diversification and increase public revenues.

Most economists coincide on the point that FDI inflows stimulate productivity by its capital, technology, and entrepreneurial skills hence economic development. For instance, FDI inflows may lead to the establishment of new expensive production facilities that facilitate economic diversification as well as enhance the value of existing production facilities which could be difficult to be developed by using domestic capital within the host countries. On addition to that, FDI inflows pose a threat to domestic firms as they share market. This leads to the growth of competition between FDI and indigenous operations in order to survive in business hence stimulate product localization, creativity and technology transfer for efficiency.

Another benefit of FDI inflows is linked with improving capabilities and skills of the host country population. This occurs as in most cases FDI operations require advanced technology and modern tools and effective practices while daily activities are done by local people which are made possible by building capacities through training hence improve indigenous capabilities and skills. Thus, these people who are linked with FDI operations learn by doing and in some cases, imported technology are transferred to the local entrepreneurs copying in order to improve their business consequently upgrade production technology of local firms in the host country.

Furthermore, expansion of trade is another benefit. Studies on FDI inflows reveal that often affiliates or subsidiary companies maintain trade links with parent company or parent company's consumers or both. This widens the market hence investment as the two are integrated. Apart from this, FDI inflows also help in improving production standard because MNEs usually operate at higher environmental and social standards than indigenous firms in developing countries.

Contrary to the above discussion, it should be known that not all FDI are beneficial; however, this paper has only emphasized on the benefits of FDI inflows as argued by (Asiedu, 2004; Moosa, 2016).

2.3 Physical Infrastructure, Competitiveness and Location advantages

Competitiveness comes from the word competition which means a struggle between two or more actors striving to gain benefits over each other within a framework of rules (Filo, 2008). Thus, competitiveness generally means the ability of the body to compete, triumph and sustain its influence in the market, by increasing its market share and benefits to the extent of strengthening its commercial activities successfully (Filo, 2008). Moreover, Mooya (2003) define regional competitiveness as the *'set of institutions, policies, and factors that determine the level of productivity of a country'*. Therefore, in this context, the concept of competitiveness is applied to mean the degree of a place to influence location decision of investment consequently affect FDI inflows. According to Porter et al. (2007), physical infrastructure is among the 12 pillars of competitiveness of the place, however, it is considered as the basic requirement for competitiveness in resource-driven economies, hence is crucial in most developing countries.

Location advantages are factors which can change the propensity of a host country and are under its control (Mooya, 2003). Physical infrastructure is an example. Most host countries invest massively on modern infrastructure as a strategy to improve their location advantages against their competitors. Therefore, the two concepts of competitiveness and location

advantage influence each other because any location advantage raises the competitiveness of the place and vice versa (Porter et al., 2007; Filo, 2008; Dunning, 1988; Dunning et al., 1992; Dunning & Narula, 1996).

Many scholars have acknowledged the influence of adequate and efficient physical infrastructure in attracting FDI inflows (Ahmad, Ismail, & Nordin, 2015; Asiedu, 2004; Assunção, Forte, & Teixeira, 2013; Bakar, Che Mat, & Harun, 2012; Bevan & Estrin, 2004; Castro, 2008; E. Demirhan & Masca, 2008b; Dunning, 1988; Fung et al., 2005; Harzing & Giroud, 2014); this means that its availability raises both competitiveness and location advantage of a place over other places and therefore attract more FDI inflows.

2.3.1 Types of Physical Infrastructure

The term physical infrastructure refers to tangible structures which promote daily economic processes (Goel, 2003). In this study, they are categorized into surface transport which include road network, railway and port services; air transportation which means number of airports; ICT installations which reflect to number of people with access to mobile phone networks and internet; and electricity supply for both industrial and domestic uses (World Bank, 1994).

Air and surface means of transports play a significant role in facilitating mobility of labor, goods and raw materials (Craig Pirrong, 2014). Their primary benefits are to increase accessibility. According to (Khadaroo & Seetanah, 2009) availability of transport infrastructure at free or cheap price positively influence productivity of firms as the result reduce transport costs hence increase the competitiveness of the region for resource-seeking as well as market-seeking FDI inflows (ibid). For instance effective road network designs, materials and maintenance can reduce transportation costs due to low wear and tear on vehicles (ibid). Moreover, the concept that time is money explain why a freeway is preferred to washed out dirt road, similarly for email services to posting services (ibid). (Erenburg, 1993) submits that if infrastructure were not provided in Africa, both domestic and foreign enterprises would operate less efficiently; and their attempt to provide their own networks would result in duplication and wastage of resources. Consequently, FDI inflows in developing countries to take advantages of low-cost labour could not happen if there would be higher costs of transport due to inadequate infrastructure (Khadaroo & Seetanah, 2009).

2.3.2 Importance of Physical Infrastructure

According to Goel (2003); physical infrastructures are fundamental structures, systems, and facilities which service a region's (country's/ city's/ area's) economy to function. SHAH (2014) submits that both adequacy and effectiveness of physical infrastructure are important for the efficient performance of FDI inflow operations. This is because efficient physical infrastructure reduces overall production costs (Asiedu, 2004) and therefore influences decisions of investors in locating businesses (Ahmad et al., 2015). Therefore, high quality of physical infrastructure does not only promote productivity but also catalyze investment efficiency in developing countries (Khan and Kim, 1999 in Rehman, et al., 2011). Hence, Rehman et al. (2011) submits that adequate physical infrastructure stock promotes both types of FDI inflows, with comparatively more impact on vertical FDI as it reduces operational costs.

A number of scholars acknowledge the positive effect of physical infrastructure to FDI inflows. Iwanow & Kirkpatrick (2006) report about the significance of physical infrastructure

to export performance that a 10 percent improvement in physical infrastructure increases the exports by 8 percent in developing countries. Alternatively, it is put forward that poor physical infrastructure causes an increase in transaction cost and limit access to both local and global markets which ultimately discourages FDI inflows in a host country (Iwanow & Kirkpatrick, 2006). This is explained by Haughwout (2001) which finds that availability of non-excludable physical infrastructure lowers the cost of private firms even if there is no direct role of infrastructure in the production of private firms. Therefore, quality of physical infrastructure has an impact on FDI inflows as well as the performance of export which motivate inward FDI for a country and trading block (Rehman et al., 2011).

The significance of physical infrastructure effect on FDI inflows varies from one place to another. Rehman et al. (2011) propose that the impact of physical infrastructure in developing countries may be different from that in developed countries. There is ample evidence of literature that proposes that physical infrastructure has a significant pulling effect to FDI inflows in developing countries (Asiedu, 2002; Asiedu, 2006; Khadaroo & Seetanah, 2009; Rehman et al., 2011). In addition, the assessment by Sekkat & Veganzones□Varoudakis (2007) uncovers that the strength of physical infrastructure in attracting FDI inflows exceeds that of openness and investment climate in developing countries.

Contrary to the above, there are few studies which deviate from this proposition. The study by Addison et al. (2006) in (Rehman et al., 2011) uncovers that physical infrastructure has attractiveness effect to FDI inflows in developed countries, but not in developed countries. Furthermore, Bae (2008) in (Rehman et al., 2011) proposes that in developed countries, infrastructure is not a motivator but an indicator to attract FDI inflows in large emerging economies.

In emerging economies, the role of infrastructure is twofold; promotion of FDI inflow and maximization of profits by lowering production costs of firms (Rehman et al., 2011). (Fung et al., 2005) in their study find that soft infrastructure provides twice returns in the sense that economic reforms such as market-friendly policies, regulations, and procedures invite more FDI as compared to hard infrastructure in emerging economies. In this perspective, hard infrastructure refers to roadways, communication installations, and highway; and soft infrastructure refers to transparent institutions and intensive reforms (Fung et al., 2005).

Other effects of infrastructure which this study introduces are increase of betweeness centrality and integration of the place. Betweeness centrality/ choice is the measure of passing flows torwards destination, a space with higher value is the busier one hence is the preferred destination of investment due to generated multiplier effect from frequent movements. Therefore, it is expected that countries with higher choice values due to adequate transportation networks attract more FDI than the ones with lower choice values. While integration is the measure of how close space is to all other spaces in the defined radius in terms of ease access torward destination. Thus, space with higher value means is distant from other spaces hence has low degree of integration. Being the case, places with high degree of integration are those with lowest value of integration (i.e. are close to all other places), a condition which promotes FDI inflow to the space. However, the higher the value of average integration indicates that the place is distant form other places (i.e. low degree of integration) hence is disadvantaged for FDI inflows.

2.4 Physical infrastructure and FDI inflows to host country

There are conflicting propositions on the statistical significance of the contribution of infrastructure to the efficient performance of private firms (Holtz-Eakin & Smeeding, 1994; Holtz-Eakin & Schwartz, 1995; Holtz-Eakin & Schwartz, 1995). However, adequate and efficient infrastructure stock is one of the significant determinants for FDI inflow in a country (Rehman et al., 2011). Haughwout (2001) submits about the contribution of infrastructure on performance of private firm that it can be direct as one of the inputs of production or indirect at least by lowering production costs from agglomeration and clustering of firms. Furthermore, the essence of infrastructure can be cited from (Erenburg, 1993) submission which proposes that both domestic and foreign private firms become less efficient without public provided infrastructure and their efforts to establish own networks increase production costs and lead to duplication.

Further emphasis of infrastructure stock on attracting FDI inflows is that the former is associated with profit maximization of enterprises as it improves accessibility and reduces transport costs (Khadaroo & Seetanah, 2009). With this regard, there are empirical researches which find public infrastructure is positively significant for growth and cost structure of private firms (Aschauer, 1989; Nadiri & Mamuneas, 1994; Haughwout, 2001). Subsequent to this, Kumar (2001) in his study proposes that establishment of infrastructure networks in the country or region should be considered as an integral part of the strategy to attract FDI inflows.

Adequate and effective infrastructure within a country or region encourages firms to invest in hence increase of FDI inflow. Ahmad et al. (2015) emphasize infrastructure stock as ‘‘*the driving force in the flow of FDI into a country’’ (p.585).* Among the first influential studies to work on this are that of (Root & Ahmed, 1979; Schneider & Frey, 1985) which establish a positive relationship of infrastructure availability on FDI inflows. These studies have been succeeded by other researches which have found more about statistical relationship between infrastructure and FDI inflow. One of the most critical papers was that of (Wheeler & Mody, 1992) which finds that the degree of statistical significance of infrastructure availability on FDI inflows depends on the quality of a particular infrastructure. (Khadaroo & Seetanah, 2009 pp.8) find that ‘‘*quality of transport, communications, energy infrastructure and degree of industrialization’’* reveal the strong statistical effect on investment inflows which ranges from 1.57 to 2.54. This was further stressed by (Erden & Holcombe, 2005; Yol & Teng, 2009) in their findings that improvements of infrastructure by 1.0 percent stimulate the increase of FDI inflows by 2.6 percent annually and increase of infrastructure investment by 10 percent leads to the raise of private investment by 2 percent respectively. With this regard, it is put forward that ‘‘*the start-up cost of doing business is less if the host country is able to provide efficient transportation systems and other public infrastructure’’* (Erenburg, 1993 in Ahmad et al., 2015 pp.585).

The term infrastructure is broad; it encompasses a number of things ranging from physical facilities to social capital. The term has evolved from its military context to economic context due to new concern and priorities. With this regard, today the term infrastructure refers to tangible and non-tangible establishments. Therefore, the statistical significance of infrastructure on FDI inflow is a general effect which is contributed by different measures of infrastructure that may have a different statistical effect. Today, there is empirical literature around the globe which proposes the significance of infrastructure (both tangible and non-tangible) in attracting FDI inflows. Rehman et al. (2011) submit that poor infrastructure

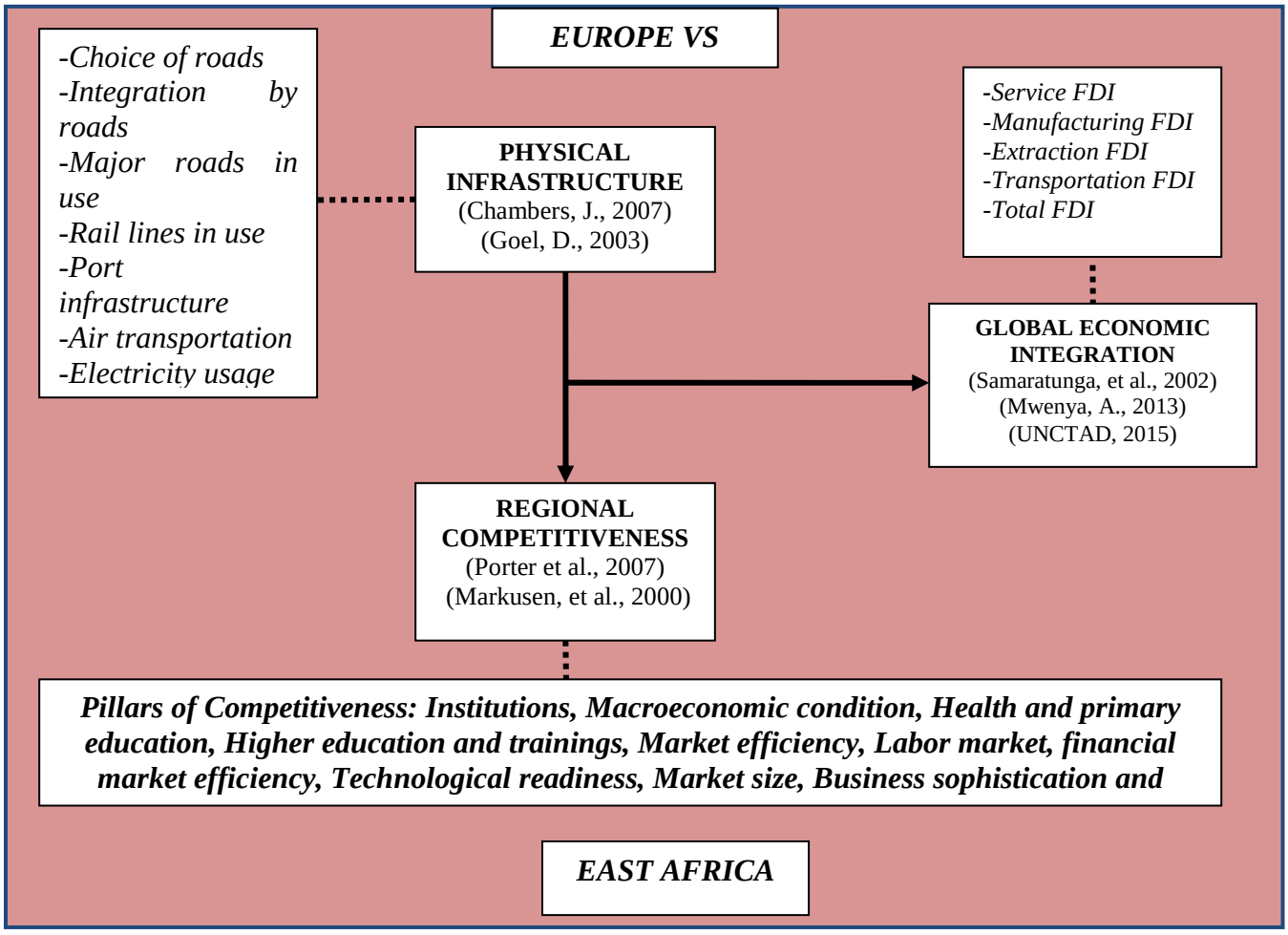
raises operation costs of firms and impede both local and foreign markets hence hampers FDI inflows in developing countries. As the result, FDI inflows in a host country to exploit cheap labour and natural resources may not occur due to unreliable and inadequate infrastructure which will cause production cost to be high (Ahmad et al., 2015).

2.5 Conceptual framework of the study

In assessing the significance of physical infrastructure as a factor which affects location advantages and competitiveness of the place for attracting FDI inflows in East African region, Africa, and Western Europe, the conceptual framework was drawn under is established basing on OLI Paradigm and the theory of economic integration.

The diagram on Figure 6 below describes that physical infrastructure namely roads networks, railway lines, ICT services, and electricity promote the competitiveness of the region. Moreover, in collaboration with other competitiveness factors they influence global economic integration the phenomenon which favours inflows of FDI in service, manufacturing and extraction sectors.

Figure 5: Conceptual framework



Source: Author, 2016.

Chapter 3: Research Design and Methods

The focus of this chapter is to establish measurable indicators for variables and linkage between research questions and indicators of the study based on reviewed literature in order to facilitate collection and analysis of appropriate data that will provide conclusions which are relevant and realistic. Furthermore the data collection method, tool for data collection as well as methods for data analysis will be introduced. Thus, this study is as unique as other researches due to the unique methodology which is applied in order to come up with realistic outputs.

3.1 Research objectives

1.3.1. Main Objective

The main objective of this study is to add knowledge about FDI by explaining the role of physical infrastructure as one of the determinants of FDI inflows for economic development in East African sub-region.

1.3.2. Specific Objectives

- To compare between Africa and Western Europe the contribution of physical infrastructure in attracting FDI inflows.
- To explain the impact of physical infrastructure on FDI inflows in East Africa.

3.2 Revised Research Question

In order to understand the subject in accordance with its objectives, several kinds of literature have been reviewed. The reviews have led to the necessity of reformulating the main research question in order to facilitate finding identifiable indicators that suit designed method of statistical analysis.

The main research question:-

- Is physical infrastructure crucial determinant for FDI inflow in East Africa, Africa, and Europe?

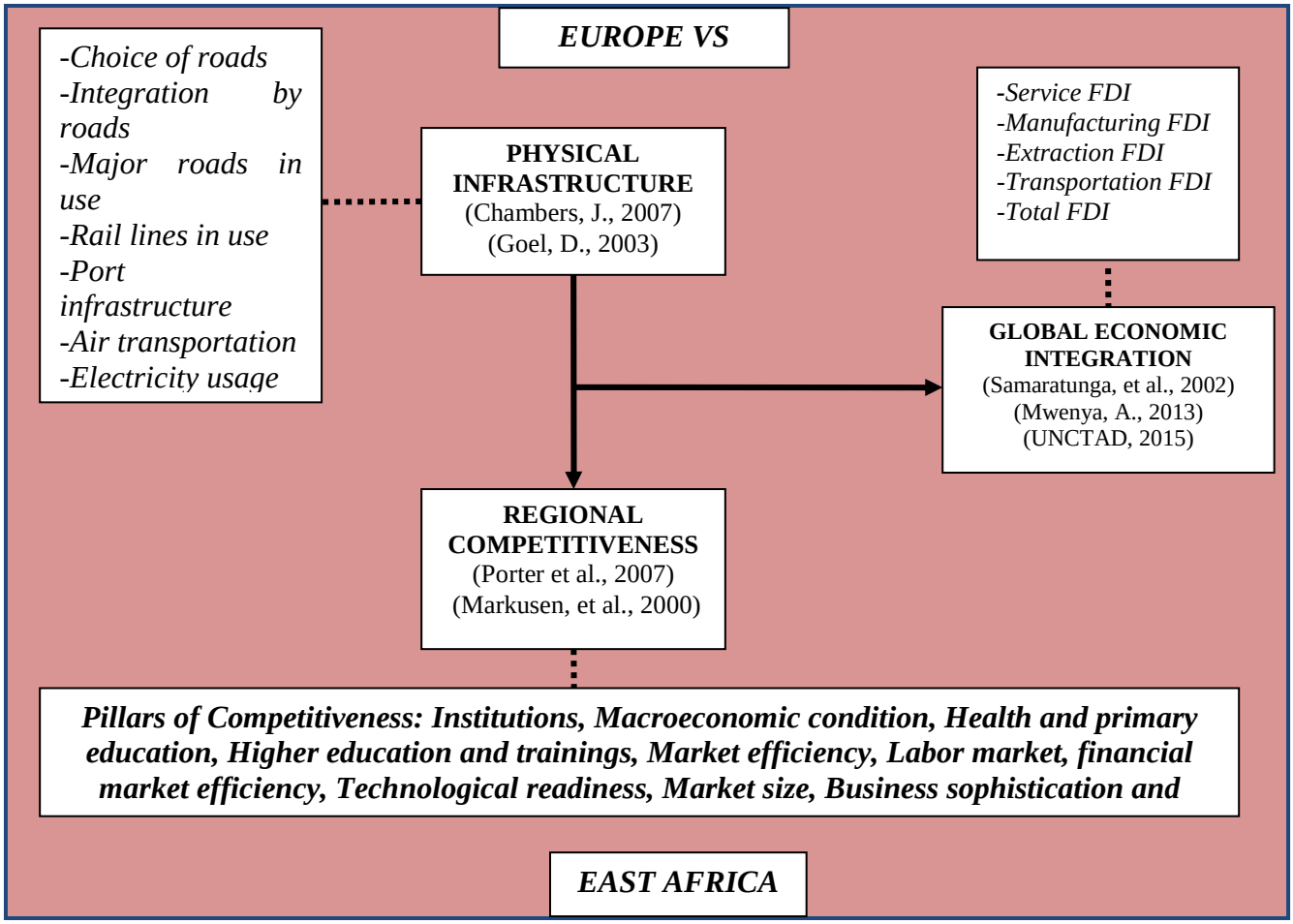
The above question has been broken down into the following sub-questions:-

- What is the contribution of adequate transportation network in attracting:-
  - -Total FDI inflows in Africa and Western Europe?
  - -Total FDI inflows in East Africa region?
- What is the impact of cumulative physical infrastructure stock on:-
  - -Total FDI inflows in Africa and Europe?
  - -Total FDI inflows in East Africa region?
- To what extent does the specific infrastructure influence:-
  - - FDI inflows in manufacturing and transportation sectors for African and European regions respectively?
  - - FDI inflows in manufacturing, service and extraction sectors in East African countries?

3.3 Conceptual framework

In assessing the significance of physical infrastructure as a factor which affects location advantages and competitiveness of the place for attracting FDI inflows in East African sub-region, the conceptual framework drawn under is established basing on OLI Paradigm and the theory of Economic Integration.

Figure 6: Conceptual plan



Source: Author, 2016.

The diagram in Figure 7 above describes that physical infrastructure namely roads networks, railway lines, ports, electricity, mobile telephone and fixed internet services promote the competitiveness of the region. Moreover, a set of competitiveness factors (pillars of competitiveness) in which physical infrastructure is one of the subset influence global economic integration the phenomenon which favours inflows of FDI in service, manufacturing and extraction sectors.

3.4 Definitions of the concepts

Table 1: Definition of main concepts

CONCEPT	CITATION		MODIFIED DEFINITION
	SOURCE	DEFINITION	
Global economic integration	Carbaugh, 2004; Ballassa, 1994;	It is the process by which firms and economies of separate nations merge in large entities and remove all discriminatory barriers to economic cooperation. Thus, it can be measured by trade and financial flows.	Global economic integration refers to reduced restrictions on the cross-border movement of investment capital which is associated with technology, skills, and international standards in order to expand markets and influence.
	Mwenya, 2013; Samaratunga, et al., 2002	It is the collaboration among neighbouring countries through enhancing cross-border flows of goods, services, labor, capital and information by reducing barriers to trade between member countries in order to expand markets for goods and services and exploit scale economies in supply chains and labor markets.	
	Tinbergen, 1954; Mutharika, 1972	It means unification of countries for cooperating in economic activities in order to enhance the global economic development of that particular country.	
Physical infrastructure	Buhr, 2003; John, et al., 2004	Physical infrastructure refers to large physical networks necessary for the functioning of a modern industrial nation.	Physical infrastructure is the framework of networks and facilities that enable and enhance production and societal living conditions.
	Goel, 2002; Torrisi, 2009; Chambers, 2007; Zhang, 2004.	Physical infrastructure is the framework of inter-related systems that provide commodities and services which enable, sustain and enhance societal living conditions. It includes road networks, railway lines, electric generation and supply, water supply, ICT services installations, air strips and services and ports.	
Competitiveness	Malecki, 2002	Competitiveness is the ability of local economy and society to provide an increasing standard of living for its inhabitants	Competitiveness is the degree of the region to attract foreign investments due to promising business environments as the result of adequate physical infrastructure.
	Markusen, 1996	Competitiveness is the attractiveness of the region to both investments and skilled labor on one side and holds their operations within locality on the other side.	
	Ranci, 2011	Urban competitiveness refers to the economic performance achieved by cities in relation to the role played in the global economy.	
	Porter, et al., 2007	Regional competitiveness is determined by a 'set of institutions, policies, and factors that determine the level of productivity of a country'.	

Source: Author, 2016

3.5 Operationalization of the concepts of the study

The main aim of Operationalization is to convert theoretical concepts to entities that can be measured in the real world. Operationalization will unpack the concepts that are discussed in the conceptual framework to smaller units called variables. This will be the basic step to help the study to have clear indicators on what have been discussed in literature review. The following table 2 shows how the mentioned research questions will be addressed.

Overall question: Is physical infrastructure crucial determinant for FDI inflow in East African, African and European countries?

- What is the contribution of adequate transportation network in attracting:-
  -Total FDI inflows in Africa and Western Europe?
  -Total FDI inflows in East Africa region?
- What is the impact of cumulative physical infrastructure stock on:-
  -Total FDI inflows in Africa and Europe?
  -Total FDI inflows in East Africa region?
- To what extent does the specific infrastructure influence:-
  - FDI inflows in manufacturing and transportation sectors for African and European regions respectively?
  - FDI inflows in manufacturing, service and extraction sectors in East African countries?

Table 2: Variables of the study

Sub-questions	Concepts	Variables	Indicators	Source of Data
1,2 & 3	Global economic integration	Service FDI	➢ Value of Greenfield FDI in service sector	FDI market data
		Manufacturing FDI	➢ Value of Greenfield FDI in manufacturing sector	
		Extraction FDI	➢ Value of Greenfield FDI in extraction sector	
		Transportation FDI	➢ Value of Greenfield FDI in transportation sector	
		Total FDI	➢ Overall value of Greenfield FDI in a country	
1,2 & 3	Physical infrastructure	Infrastructure stock	➢ Infrastructure index including internet	
			➢ Infrastructure index excluding internet	
		Surface transportation	➢ Quality of road networks in use ➢ Quality of rail lines in use ➢ Quality of available port services	GCI data
		Air transportation services	➢ Quality of air transportation services	
		ICT services	➢ Number of mobile telephone subscriptions per 100 people ➢ Number of fixed broadband internet subscriptions	
		Reliable electricity	➢ Quality of electricity supply index	
1,2 & 3	Competitiveness	Quality of institutions	➢ Business cost of crime and violence index ➢ Strength of investor protection index	GCI data
1,2 & 3		Macroeconomic condition	➢ Macroeconomic catalyst index ➢ Gross national savings index ➢ Inflation index	GCI data
1,2 & 3		Health and primary education	➢ Health catalyst index ➢ Life expectancy index	GCI data
1,2 & 3		Higher education and training	➢ Tertiary education enrolment rate ➢ Availability of research and training services	GCI data
1,2 & 3		Goods market efficiency	➢ Trade tariffs ➢ Total tax rate	GCI data
1,2 & 3		Labor market efficiency	➢ Labor market catalyst ➢ Cooperation in labor-employer relations ➢ Flexibility of wage determination	GCI data
1,2 & 3		Financial market development	➢ Financial market catalyst ➢ Availability of financial services ➢ Ease of access to loans	GCI data
1,2 & 3		Technological readiness	➢ Technological readiness catalyst ➢ Availability of latest technologies ➢ Firm-level technology absorption	GCI data
1,2 & 3		Market size	➢ Market size catalyst index ➢ Foreign market size index	GCI data

			➢ Domestic market size index	
1,2 & 3		Business sophistication	➢ Local suppliers quantity index ➢ Local suppliers quality index	GCI data
1,2 & 3		Innovation	➢ Innovation catalyst index ➢ Availability of scientists and engineers ➢ Quality of scientific research institutions index	GCI data

Source: Author, 2016 based on Carbaugh, 2004; Ballassa, 1994; Mwenya, 2013; Samaratunga, et al., 2002 Goel, 2002; Torrisi, 2009; Chambers, 2007; Zhang, 2004. Porter, et al., 2007; Ranci, 2011.

3.6. Explanation of the Variables and Indicators

The study's objective is to explain the impacts of physical infrastructure in enhancing economic integration for the betterment of the East African countries by benchmarking it with Europe and Africa. Thus, in order to identify the strength of physical infrastructure on global economic integration, the former and the pillars of competitiveness are examined in parallel as independent variables in the regression.

3.6.1 Greenfield FDI

This is the dependent variable of this study. According to (König, 2014), volumes of FDI inflows in a place indicate the locational advantage of the places over its competitors in the global economy with other places and easiness of doing business in that place. The time series data for Greenfield FDI inflows will be obtained from FDI market database for the period of 2006 to 2014 in order to explain the trend of FDI inflows which in this case is a proxy for economic integration. Therefore, for the purpose of this study, severl types of FDI will be used such as total FDI and sector FDI such as manufacturing FDI, service FDI, extraction FDI and transportation FDI.

3.6.2 Physical infrastructure

Literatures acknowledge the influence of physical infrastructure in maximizing business profits and hence FDI inflows. Adequate and effective physical infrastructure is important for business operations as it create conducive environments for movements of factors of production and access of markets. Moreover, the flow of forces of productions and optimal utilization of available resources for economic betterment reduces incomes disparity especially in vast regions. In this study, physical infrastructure is proxied with quality of road networks, railway lines, port infrastructure, air transportation infrastructure, electric supply and ability to subscribe to broadband internet service and mobile telephone.

3.6.3 Institutions (Pillar 1)

The quality and capacity of institutions is vital for development of businesses and hence FDI inflows. This is because high quality of institutions advocates rule of law, openness and professionalism which all together reduce bureaucracy, corruption and professionalism which all together promotes business efficiency, tranquillity and rule of law. In this study, a high quality institution is proxied with lower costs of businesses and investors' protection. The former is expected to show negative influence while the latter is expected to show positive influence.

3.6.4 Macroeconomic environment (Pillar 3)
This pillar indicates macroeconomic status of the country. For the purpose of this study it is proxied with macroeconomic environment catalyst, gross national savings and inflation. All indicators are expected to show positive influence to FDI inflows.

3.6.5 Health and Primary education (Pillar 4)
This factor is vital for a health and skills of working class. The population with poor health and low ability to learn cannot produce efficiently due to absenteeism, production costs and inability to learn. This is because ignorance constrains the development of businesses as it impedes improvements in either high value-added products or value-intensive products. This variable is proxied with health catalyst and life expectancy; and it is expected that they will show positive influence.

3.6.6 Higher education and training (Pillar 5)
When there is a free market, presence of killed population facilitates efficiency in complex processes and dynamism to the technological changes and production processes. Such working class is significant in complex tasks of adding-value for domestic and foreign market demands and hence economic growth. This variable is proxied with tertiary education enrolment and availability of scientific research and trainings. They are all expected to show positive influence in attracting FDI.

3.6.7 Goods market efficiency (Pillar 6)
It is deduced that when there is elimination of economic borders; authorities' interference in businesses is reduced. This effect of economic integration is said to influence movements of cross-border commodities. This condition promotes competition among firms towards markets hence lead to innovation growth. This variable is proxied with trade tariffs and total tax rate, and they are all expected to show positive effect to FDI inflows.

3.6.8 Labor market efficiency (Pillar 7)
A free movement of factors of production due to free markets markets facilitates movement of labor too. However, labor as a factor of production move to places where there is opportunities to earn from complex tasks. Therefore, a place with efficient labor market promises the working class their most productive use in exchange of financial gains. One of the importances of economic integration in labor efficiency is that it allows dynamism of working class for recovery especially when there are technological changes or booming of new industry. This variable is proxied with cooperation in labor and flexibility of wage determination. These indicators ae expected to show positive influence to FDI inflows.

3.6.9 Financial market development (Pillar 8)
This pillar measures the level of development of financial market sector. It is about its ability to provide investment capital promptly by considering all risks necessary. It is proxied with ease of access to loans and availability of financial services. It is expected that the indicators will show positive effect to FDI inflow.

3.6.10. Technological readiness (Pillar 9
This pillar examines the ability of production environments in a country to adapt new production technologies in manufacturing, service and extraction sectors. Moreover, it

examines the capacity of a country to influence utilization of internet services in transaction and communication services as a way to boost business environments. This variable is proxied with technological readiness catalyst, availability of latest technology and firm-level technological absorption which are expected to shoe positive significance.

3.6.11 Market size (Pillar 10)

Market size is determined by the ability of the population to buy; which is affected by population size and individual incomes. The idea behind global economic integration is elimination of trade restrictions in order to avoid political borders in trades. Thus, hence free trade is fundamental for expanding market size at regional and global scales. In this study it is proxied with market size catalyst, domestic market size and foreign market size; thay are expected to show positive influence.

3.6.12 Business sophistication (Pillar 11)

In this era of science and technology, quality of business technology is important for the growth of businesses industry. In this study, this variable is proxied with quantity and quality local suppliers. It is expected that they both show positive influence to FDI inflows.

3.6.13 Innovation (Pillar 12)

Innovation is vital for the firm to alien with customers and increase its market share in the globe. There are evident examples which show how innovation is important in business growth, wealth accumulation and profit maximization. For instance, according to van Knaap, et al. (2011), until to date the world has gone through four eras of remarkable technological innovations which have had great economic impacts; namely steam power engines (1830s – 1880s), electric power (1880s – 1930s), oil as source of power (1930s – 1980s) and information technology (1980s – 1930s). General examination shows that in each of the aforementioned eras, the globe benefited at large in specific means that lead to improving productions through innovations of industrial and transportation engines; and connectivity and telecommunications. In this study, the proxies for this variable are innovation catalyst, quality of scientific research institutions and availability of scientists and engineers.

3.7 Research Strategy

In order to find out the significance of physical infrastructure in enhancing the global economic integration in East Africa, Africa, and Europe; this study employs secondary quantitative analysis as the strategy. This is because the study aims to explain the causal relationship existing between independent and dependent variables with a focus on breadth and generalization rather that depth and specificity (Mwenya, 2013). Therefore, the analysis will rely on existing time series quantitative data to explain the causal relationship as proposed in OLI paradigm (Ajitabh & Momaya, 2004) and theory of economic integration (Balassa, 1994).

The choice of this strategy has been influenced by the goal of the research which will be attained by answering the research questions. The setup of the questions requires large number of research units (observations) as well as many independent variables (many predicting factors apart from physical infrastructure) in order to be in the position to clarify the significance of physical infrastructure in influencing inward flow FDI as the measure of global economic integration (dependent variable). Basing on literature, the influence of

physical infrastructure on FDI inflow in East Africa, Africa, and Western Europe will be examined by comparing with other factors which are recognized as determinants of global economic integration of the region namely pillars of regional competitiveness. Thus, in order to explain this phenomenon, I will gather established values of indices and volumes of inward FDI for different countries from reliable sources in order to analyse their relationship

Since the study is time series, information will be collected for different countries over a period of 2006 to 2014 in order to understand the trend of changes between dependent and independent variables in order to explain the causality existing between the variables for different regions of East Africa, Africa, and Western Europe. Therefore, the choice of this strategy is because the study is deductive, hence aims to explain the relationship between the changes in physical infrastructure and FDI inflows over the period of 9 years (2006 – 2014) as proposed by economic integration theory and OLI Paradigm. Moreover, the area of study is large i.e. 5 countries which form the East African Community (Burundi, Kenya, Tanzania, Rwanda, and Uganda). Thus, the strategy suits to facilitate the study to cover this wide geographical area at relatively low costs and within a shorter period of time.

3.7.1 Data Collection Methods

The study will fully rely on secondary data. The data will be collected from a number of sources; such as FDI market database (2015), United Nations Conference on Trade and Development website (UNCTAD), World Bank (2015) reports, Global Competitiveness Indices database (2015), Specific Country's profiles (2015) and reports (2015) on foreign investment flows, business environments and state of physical infrastructure. The information from FDI market database, UNCTAD website, World Bank reports and Specific country's profile will be reviewed in order to capture volumes of Greenfield FDI inflows in service, manufacturing and extractive sectors for the period of 2006 to 2014. Moreover, the information from Global Competitiveness Indices database, World Bank reports, State of infrastructure reports will be used to capture values of indicators for the variables under the concept of competitiveness and physical infrastructure which are the independent variables in the study.

These indicator values will mainly be captured from sources which have frequently been used by other researchers, in order to provide realistic results. These sources include the FDI market database and Global Competitiveness Index report; the meanings of the variables in these sources comply with the meaning applied in this study, however, other sources of information will be used for triangulation purposes.

3.7.2 Sampling and sample selection

The study tries to explain the theoretical propositions of physical infrastructure and global economic integration in East Africa. Thus, in order to understand the phenomenon; Europe has been chosen as the region with the high quality of physical infrastructure and African countries as the region with the poor quality of physical infrastructure. The findings from the two regions will used as benchmarks to explain the impact of physical infrastructure in attracting FDI in East Africa. The influence of physical infrastructure on global economic integration is tested in these two regions to establish the relationship which will be used to explain the impact of physical infrastructure in East Africa. In general the study covers a total of 69 countries (i.e. 37 from Europe and 32 from Africa).

For East Africa, five countries with different characteristics have been chosen; two Kenya and Tanzania have access to sea while the three Burundi, Rwanda, and Uganda are lands locked; furthermore, three countries have vast land size and the two are small in size. These differences are expected to display some crucial information which complies with theories and previous studies or not.

3.7.3 Reliability and Validity

Thiel (2014) argues that reliability help us to understand if the variables have been measured consistently and accurately hence can provide a correct explanation for the phenomenon, while validity guarantee correct measurements of anticipated predictions.

In order to ensure validity, the study uses a large data set of FDI inflows for 9 consecutive years in 5 countries located within the same geographical region but with different location characteristics as two countries have direct access to the port (international gateway) while the remaining three are land locked. This difference is expected to be displayed by results, and hence get into agreement with the theory to acquire external validity that can make it credible for generalization in other places. Moreover, the concept of the study is based on comprehensive theories which have shown relevance in many types of research. The application of these theories in this study aims to provide internal validity in the sense that the variables whose causal relationship is measured have already been proved to affect each other; hence the findings help in adding new knowledge or verifying the existing theories (Tinbergen, 1954).

Reliability of the study is determined by the degree of consistency of the measurement used. Since this study relies on secondary data as sources of data, such sources need to be consistent. The different meanings for similar concepts are likely to provide deviating results. Therefore this study will apply sources which explain the variables and concepts in the context of this study to enhance reliability.

In this case, the sources of secondary data to be accessed will be from international organizations databases such as UNCTAD website, FDI market database, World Bank reports and specific country's profiles so that to avoid the use of data which has been prepared for other purposes such as political reasons. Moreover, the parameter of key terms of this study complies with how these sources define the terms, thus ensure conformity and uniformity of data hence reliable results. On top of that, the indicators and steps of analysis applied in this study have been applied in other previous studies hence make the findings of this study replicable and reliable (Thiel, 2014; Verschuren, Doorewaard, Poper, & Mellion, 2010).

3.7.4 Econometric model and hypothesis

Since the data collected is quantitative and continuous. The study will employ inferential analysis by using econometric model. STATA software will be used as it is appropriate software. The proposed economic model is based on the following:-

- OLS regression will be used because the data is not discrete, the proposed equation states that:-

- Equation: $\boldsymbol{Y_{ct} = \beta_0 + \beta_1 X_{c1t1} + \ldots\ldots + \beta_n X_{cntn} + \xi_{ct}}$

Where:

$\boldsymbol{Y_{ct}}$ *= Total FDI inflow in country 'c' during year 't'*

$\boldsymbol{\beta_0}$ *= Constant*
$\boldsymbol{\beta_1 X_{c1t1}}$ *= GCI value for an indicator in 1st year in country 'c'*
$\boldsymbol{\beta_n X_{cntn}}$ *= GCI value for an indicator in nth year in country 'c'*
$\boldsymbol{\xi_{t1\text{-}tn}}$ *= Error term for duration t1-tn*
t1 *= 2006 and tn = 2014*
c1 to cn *= List of countries (i.e.1st to 69th).*

Therefore, in this study the hypothesis is:-
$\boldsymbol{H_0}$ – Availability of efficient and reliable physical infrastructure is not positively significant in attracting FDI inflows in European, African and East African countries.

$\boldsymbol{H_1}$ - Availability of efficient and reliable physical infrastructure is positively significant in attracting FDI inflows in European, African and East African countries.

Chapter 4: Research Findings

4.0 Introduction

This study aims to explain the impact of physical infrastructure in attracting FDI inflow in European, African and East African countries. Therefore, the study will cover 37 European and 32 African countries (including 5 countries from East Africa sub-region) whose data were available.
The study will use FDI markets data from FDI markets.com (2006 – 2014), competitiveness indicators (main and sub-pillars) from GCI data, and segment angular choice and integration of countries by road networks from ESRI data. In order to have valid data for this study, a dataset with 621 observations from 69 countries was prepared.

The countries which are included in the dataset are African (Algeria, Angola, Botswana, Burkina Faso, Burundi, Cameroon, Chad, Ivory Coast (Cote d'Ivoire), Egypt, Ethiopia, Gabon, Ghana, Kenya, Liberia, Libya, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Tunisia, Uganda, Zambia and Zimbabwe) and European (Albania, Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Czech Republic, Denmark, Estonia, Sweden, Spain, United Kingdom, Netherlands, Portugal, Finland, Switzerland, Germany, France, Italy, Norway, Romania, Turkey, Luxembourg, Iceland, Croatia, Greece, Ireland, Lithuania, Latvia, Hungary, Serbia, Slovenia, Slovakia, Ireland, Poland, Russia, Slovenia and Ukraine.

Map 1: Area of the study

4.1 Data Organization and Presentation

4.1.1 Dependent variable (FDI value)

FDI values by countries were obtained from FDI markets.com website which shows all Greenfield investments from sources to destinations. In Europe countries, FDI inflows in

activity transportation and total FDI are used. In African countries, FDI inflows in manufacturing and total are used; while in East Africa, manufacturing FDI, service FDI, extraction FDI and total FDI are used. The study aims to explain the correlation which exists between FDI inflows in a particular country and its level of infrastructure development.

4.1.2 Independent variables (pillars and sub-pillars)

The GCI pillars were calculated, using a set of 57 sub-indicators grouped into 16 thematic categories. These indicators are drawn from the Global Competitiveness Indicators which consist of a set of institutions, policies and factors that determine the level of productivity of a country, conditions of public institutions and technical conditions.

The single pillars have been adapted to the scale and nature of this study i.e. we selected a set of dimensions and indicators corresponding to factors that contribute to inward Greenfield FDI in countries. These subsectors have been used to construct the main pillars which have been grouped into catalysts and burdens; where catalysts are the group of sub-indicators that have a positive effect on foreign direct investments (FDI) while burdens have a negative effect. Selection of the indicators is based on theory and the P2 computation (Perez- Luque et al, 2015) is not affected by the categories used to group the pillars.

The computation of the pillars used the P2 distance index, a synthetic index that combines all of these indicators into a single value (Garcia et al., 2015). This approach has also been used to build synthetic indicators in other disciplines such as well-being and other social indicators (Garcia et al, 2015). It allows comparisons between entities (both temporal and spatial) and is considered to be an exhaustive synthetic indicator because it is not based on a reduction of information. It considers all the valuable information contained in the variables used to build it allowing the inclusion of a large number of variables, since all redundant variance is removed by the process itself, as is the multi collinearity (Montero et al., 2010; Garcia et al., 2015).

To calculate the P2 distance, we started with a matrix X of order (m, n) in which m is the number of spatial units (countries) and n, the number of variables. Each element of this matrix, (Xri), is the value of the variable (i) in the spatial entity (r). The P2 distance indicator calculates the distance of each spatial entity with regard to a theoretical spatial entity of reference. Initially, a distance matrix D is calculated as:

$$d\text{ri}=|\text{Xri}-\text{X*i}|$$

where $x'i$ is the r-th element of the reference base vector
$X' = (x'1, x'2, \ldots, x'n)$. For each variable a reference value must be defined to compare different spatial entities (Garcia et al. 2015).

Table 3: Reliability and Validity of selected indicators

Variable	No. of Observation	Mean	Standard Deviation
Global economic integration			
Europe			
Total FDI	333	6264.121	8816.306
Transportation FDI	333	494.0912	808.8361
Africa			
Total FDI	288	2108.303	4894.922

Manufacturing FDI	288	1004.027	3359.604
East Africa			
Total FDI	45	861.2326	1299.861
Manufacturing FDI	45	233.8869	396.2885
Service FDI	45	301.4741	422.9637
Extraction FDI	45	325.8716	875.1086
Physical infrastructure **Europe**			
Physical infrastructure stock including internet	333	5.186426	1.639622
Physical infrastructure stock excluding internet	333	4.076666	1.315257
Segment angular choice	333	10100000	10100000
Segment angular integration	333	0.027035	0.0098627
Quality of road network	333	4.413735	1.448328
Quality of railway	333	2.85239	2.137826
Quality of ports	333	3.885182	1.781836
Quality of air transportation	333	4.912601	1.027294
Quality of electricity supply	333	5.556563	0.8736656
Quality of mobile telephone subscriptions	333	77.33869	57.25116
Quality of fixed internet subscriptions	333	51.17308	49.49051
Africa			
Physical infrastructure stock including internet	288	2.322389	2.045133
Physical infrastructure stock excluding internet	288	2.577933	1.34213
Segment angular choice	288	8005074	14500000
Segment angular integration	288	0.019604	0.0053406
Quality of road network	288	2.851424	1.381404
Quality of railway	288	1.854181	1.140242
Quality of ports	288	3.160347	1.454974
Quality of air transportation	288	3.447188	1.583574
Quality of electricity supply	288	2.861667	1.602091
Quality of mobile telephone subscriptions	288	60.27472	41.31556
Quality of fixed internet subscriptions	288	154429.6	398058.2
East Africa			
Physical infrastructure stock including internet	45	2.044583	1.27337
Physical infrastructure stock excluding internet	45	2.247274	0.9092239
Segment angular choice	45	8858552	4706519
Segment angular integration	45	0.015782	0.0036178
Quality of road network	45	2.843333	1.159175
Quality of railway	45	1.195096	1.038125
Quality of ports	45	2.984444	1.058869
Quality of air transportation	45	3.397556	1.275653
Quality of electricity supply	45	2.530444	1.098745
Quality of mobile telephone subscriptions	45	36.07711	21.59568
Quality of fixed internet subscriptions	45	20479.09	30113.27
Competitiveness **Europe** **Pillar 1: Institutions**			
Strength of investors' protection	333	5.242342	1.420899
Business cost of crime and violence	333	5.156807	0.9444487
Pillar 3: Macroeconomic condition			
Macroeconomic environment catalyst	333	5.351605	1.092845
Gross national savings	333	19.61811	7.155427
Inflation	333	10.13939	8.18656
Pillar 4: Health and Primary Education			
Health catalyst	333	76.55404	5.945094
Life expectancy	333	38.79784	24.33739
Pillar 5: Higher Education and Trainings			
Tertiary education enrollment	333	38.65108	28.23857
Availability of research and trainings	333	41.70479	29.95866

Pillar 6: Market Efficiency			
Trade tariffs	333	3.497858	2.387748
Total tax rate	333	45.58468	14.84509
Pillar 7: Labor Market Efficiency			
Cooperation in labor	333	4.597267	0.8290908
Flexibility of wage determination	333	4.655559	1.045796
Pillar 8: Financial Market Efficiency			
Financial market catalyst	333	3.853817	1.091395
Availability of financial services	333	4.655861	1.161599
Ease of access to loans	333	3.71578	1.075037
Pillar 9: Technological Readiness			
Technological readiness catalyst	333	3.142645	0.7938057
Availability of latest technology	333	4.728962	1.128273
Firm-level technological absorption	333	4.886246	0.8645101
Pillar 10: Market Size			
Market size catalyst	333	4.015845	0.8170845
Domestic market size	333	4.279198	0.9611426
Foreign market size	333	4.66502	0.9765981
Pillar 11: Business Sophistication			
Local supplier quantity	333	4.733707	0.5975484
Local supplier quality	333	4.565495	0.7876061
Pillar 12: Innovation			
Innovation catalyst	333	4.336826	1.820818
Availability of scientists and engineers	333	4.799531	0.9506744
Quality of scientific research institutions	333	4.754988	1.075015
Africa **Pillar 1: Institutions**			
Strength of investors' protection	288	4.092361	2.198117
Business cost of crime and violence	288	3.340981	1.546663
Pillar 3: Macroeconomic condition			
Macroeconomic environment catalyst	288	5.334003	0.994407
Gross national savings	288	13.11038	13.27298
Inflation	288	12.50313	40.92365
Pillar 4: Health and Primary Education			
Health catalyst	288	49.038	21.07622
Life expectancy	288	58.20662	12.19797
Pillar 5: Higher Education and Trainings			
Tertiary education enrollment	288	12.00815	13.34937
Availability of research and trainings	288	3.49445	0.795185
Pillar 6: Market Efficiency			
Trade tariffs	288	10.22068	4.538664
Total tax rate	288	39.57188	14.53754
Pillar 7: Labor Market Efficiency			
Cooperation in labor	288	3.929361	0.7850872
Flexibility of wage determination	288	4.600335	1.045891
Pillar 8: Financial Market Efficiency			
Availability of financial services	288	3.72296	0.97667
Ease of access to loans	288	2.458106	0.6942928
Pillar 9: Technological Readiness			
Availability of latest technology	288	4.109973	0.9443441
Firm-level technological absorption	288	4.07625	0.8821446
Pillar 10: Market Size			
Domestic market size	288	2.998514	0.906356
Foreign market size	288	3.763922	0.979693
Pillar 11: Business Sophistication			
Local supplier quantity	288	4.170594	0.8469802
Local supplier quality	288	3.725347	0.812002
Pillar 12: Innovation			

Availability of scientists and engineers	288	3.615152	0.7912356
Quality of scientific research institutions	288	3.107794	0.8051843
East Africa **Pillar 1: Institutions**			
Strength of investors' protection	45	3.568889	2.427665
Business cost of crime and violence	45	3.2461	1.421607
Pillar 3: Macroeconomic condition			
Macroeconomic environment catalyst	45		
Gross national savings	45	11.4027	7.329242
Inflation	45	7.3	4.738239
Pillar 4: Health and Primary Education			
Health catalyst	45	48.11858	15.72446
Life expectancy	45	59.53984	3.367848
Pillar 5: Higher Education and Trainings			
Tertiary education enrollment	45	5.481572	2.290606
Availability of research and trainings	45	3.682095	0.6591314
Pillar 6: Market Efficiency			
Trade tariffs	45	8.998279	0.369978
Total tax rate	45	41.44	7.559924
Pillar 7: Labor Market Efficiency			
Cooperation in labor	45	4.106358	0.5516499
Flexibility of wage determination	45	5.233219	0.5195214
Pillar 8: Financial Market Efficiency			
Availability of financial services	45	3.928299	0.6833615
Ease of access to loans	45	2.717841	0.5872522
Pillar 9: Technological Readiness			
Availability of latest technology	45	4.330863	0.8348678
Firm-level technological absorption	45	4.18076	0.6630779
Pillar 10: Market Size			
Domestic market size	45	2.871305	0.6835363
Foreign market size	45	3.24043	0.9027999
Pillar 11: Business Sophistication			
Local supplier quantity	45	4.33444	0.5587468
Local supplier quality	45	3.859691	0.4882094
Pillar 12: Innovation			
Availability of scientists and engineers	45	3.744123	0.392362
Quality of scientific research institutions	45	3.496285	0.6061128

4.1.3 Choice of Regression Models

According to statistical principals in undertaking multiple regressions of panel data, a number of assumption tests were carried including hausman test in order to enable the choices of appropriate models. Hausman test provided insignificant ρ-value for Europe, Africa and Europe and East Africa. Moreover, the tests for homoskedasticity showed that all dataset were heteroskedastic. Due to these results OLS – Random with robust regression model was chosen for all datasets.

4.2 Data Analysis and Findings

4.2.1 Contribution of transportation networks on FDI inflow in European, African and East African countries

Sub-question 1: *What is the contribution of extensive transportation networks in attracting:-*

a) FDI inflows in African and European countries?

b) FDI inflows in East African countries?

There are ample literatures which support the argument that there is strong correlation between volume of FDI inflows in a host country and the level of its infrastructure development. It is submitted that adequate and effective transportation network in a country is important for the efficient performance of FDI operations (SHAH, 2014) because the condition reduces overall production costs (Asiedu, 2004) and therefore influences decisions of investors in locating businesses (Ahmad et al., 2015) hence inflows of more FDI.

Generation of indicators/indices for depth of transportation network

The question above is answered by using the findings obtained from inferential and descriptive analyses which show statistical correlation between amounts of FDI inflows in a particular period of time against adequacy of transportation networks in the same period of time. In these analyses, adequacy of transportation network in a country is represented by depth of transportation network existing in same country where major and main road networks have been used; another element of transportation network which suit this analysis is length/network of railway lines in use, however it is not used due to shortage of time.

In this study, depth of major and main road networks i.e. adequacy of transportation network is represented by two indicators namely Segment angular choice/Betweeness centrality and Segment angular integration which are generated by using ArcGIS (ArcToolbox) and Space Syntax (DepthmapX(net)) softwares. Segment angular choice is a measure which indicates how likely an axial line is to be passed through on all shortest routes from all other spaces within the predetermined distance from each segment. Choice simply measures passing flow in the selected routes. High value indicates that the axial line lies on possible shortest path hence is the preferred choice and vice versa. Segment angular integration is a measure of distance from any point of origin to all others in the predetermined radius within the system. It describes how close other places are to the point of origin, thus it is seen as a measure of asymmetry. Integration simply measures the ease of access to the intended destination. High value indicates that an axial line has low degree of integration and vice versa.

The indices for both segment angular choice/betweeness centrality and segment angular integration were generated from Axial map analysis of shapefiles of major and main roads of every country (37 European and 32 African countries) by using graph analysis of axial lines at the radius of 1000 meters with Space Syntax software (see Annex 1 which shows Axial maps of all countries used to generate values segment angular choice and integration indices). The average values obtained after graph analysis of all axial maps for both indicators from all countries are shown in table 4 below:-

Table 4: Generated average values for segment angular choice and integration by country

Na.	European Country	Choice	Integration	African Country	Choice	Integration
1	Albania	5694602.4	0.0201	Algeria	83719125.3	0.010
2	Austria	12660169.6	0.0211	Angola	3296713.9	0.018
3	Belgium	7018371.1	0.0400	Botswana	3563345.6	0.024
4	Bosnia-Herzegovina	1783347.3	0.0274	Burkina Faso	4774541.0	0.022
5	Bulgaria	2684940.7	0.0230	Burundi	12410981.0	0.012
6	Croatia	10102751.7	0.0227	Cameroon	2519157.5	0.020
7	Cyprus	1312600.9	0.0295	Chad	1516225.8	0.029
8	Czech Republic	1158014.7	0.0383	Côte d'Ivoire	4968102.9	0.019
9	Denmark	8510036.7	0.0318	Egypt	7222583.2	0.020
10	Estonia	875598.6	0.0244	Ethiopia	1922426.7	0.018
11	Finland	12738320.4	0.0208	Gabon	2158711.3	0.023

12	France	32645025.7	0.0212	Ghana	5992837.5	0.021
13	Germany	51863208.0	0.0235	Kenya	3739530.2	0.019
14	Greece	7735450.1	0.0243	Liberia	1867499.9	0.021
15	Hungary	11824514.6	0.0266	Libya	6689703.3	0.020
16	Iceland	2578357.5	0.0179	Madagascar	2270178.3	0.024
17	Ireland	8162977.1	0.0241	Malawi	3242140.7	0.019
18	Italy	15542644.6	0.0202	Mali	2706282.0	0.023
19	Latvia	1443620.5	0.0265	Morocco	5363883.8	0.020
20	Lithuania	1135130.3	0.0334	Mozambique	3025565.7	0.020
21	Luxembourg	1834266.9	0.0409	Namibia	5824876.7	0.022
22	Macedonia	92863.9	0.0579	Nigeria	12356209.3	0.019
23	Netherlands	7113533.4	0.0387	Rwanda	13542798.9	0.011
24	Norway	4979448.8	0.0187	Senegal	2305035.1	0.028
25	Poland	22006233.3	0.0265	Sierra Leone	1016222.1	0.023
26	Portugal	10479343.3	0.0230	South Africa	23564687.0	0.020
27	Romania	13017171.3	0.0185	Tanzania	2680786.7	0.020
28	Russia	14487650.4	0.0207	Tunisia	7898102.9	0.020
29	Serbia	2414379.5	0.0256	Uganda	11918662.2	0.017
30	Slovakia	177476.3	0.0610	Zambia	1698393.0	0.025
31	Slovenia	5887102.7	0.0246	Zimbabwe	10387052.7	0.020
32	Spain	16969391.3	0.0205			
33	Sweden	10124617.2	0.0199			
34	Switzerland	10937450.7	0.0229			
35	Turkey	11622732.8	0.0186			
36	Ukraine	20151093.5	0.0211			
37	United Kingdom	23105248.0	0.0240			

Source: Author, 2016 based on graph analysis by Space Syntax at radius of 1000 meters of country's major and main roads data obtained from ESRI (2016).

Contribution of depth of road network to the inflow of FDI

The analysis to describe relationship between the variables is done by using total FDI inflow data for the period of 9 years (2006 – 2014), average values of segment angular choice and integration as shown in the table above and 11 pillars of competitiveness (Quality of institutions (pillar 1), Macroeconomic condition (pillar 3), Quality of health and primary education (pillar 4), Quality of higher education and trainings (pillar 5), Market goods efficiency (pillar 6), Financial market efficiency (pillar 7), Labor market efficiency (pillar 8), Technological readiness (pillar 9), Market size (pillar 10), Business sophistication (pillar 11) and Innovation (pillar 12).

When inferential analysis was done by using the above variables; the findings were as follows:-

European countries

For European countries, the analysis reveals that both indicators Segment Angular Choice and Segment Angular Integration are significant in influencing the inflows of total FDI in the control of pillars of competitiveness. The presentation of Regression model 1 in table below display that the increase in choices by 1 unit in European countries attract inflows of total FDI by 1% when there is positive contribution of firm-level technological absorption even if there is negative influence of availability of financial services and latest technology (see Regression model 1 in table 5 below).

Moreover, the presentation in Regression model 2 in the table 5 below shows that the increase in integration by 1 unit in European countries reduces the inflows of total FDI by 115,601 units when there are positive contribution of quality of local suppliers and negative contribution of business cost of crime and violence and quality of scientific research institutions.

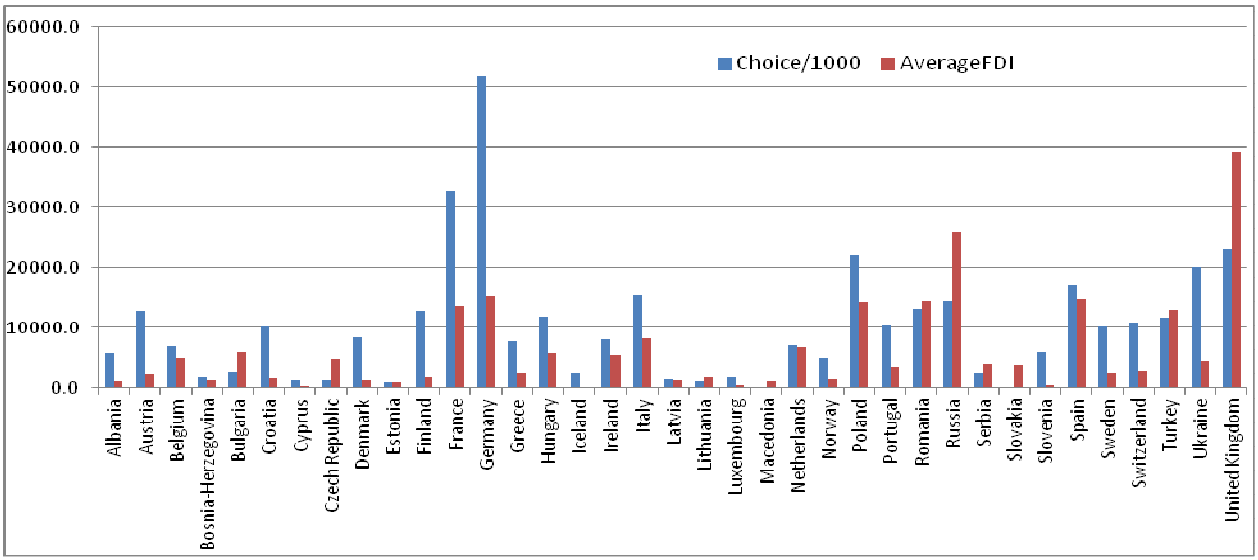
Table 5: Statistical contribution of choice and integration in attracting FDI in 29 European countries

VARIABLES	(1) Total FDI	(2) Total FDI
Extensiveness of Surface Transportation (Roads)		
Average segment angular choice	0.00101***	
	(0.000334)	
Average segment angular integration		-115,601**
		(57,943)
Quality of Institutions (Pillar 1)		
Strength of investor protection index		187.2
		(235.0)
Business cost of crime and violence index		-2,631*
		(1,407)
Macroeconomic Condition (Pillar 3)		
Gross national savings index	-7.493	
	(90.54)	
Inflation index	-172.0	
	(187.2)	
Quality of Health and Primary Education (Pillar 4)		
Life expectancy index	-28.27	
	(51.52)	
Quality of Higher Education and Training (Pillar 5)		
Tertiary education enrollment index	43.38	-33.62
	(35.07)	(30.47)
Availability of research and training services index		56.35
		(43.91)
Goods Market Efficiency Level (Pillar 6)		
Total tax rate index	-76.07	
	(54.76)	
Trade tariffs index		289.0
		(332.1)
Financial Market Efficiency Level (Pillar 8)		
Availability of financial services index	-2,408***	-1,370
	(562.6)	(1,146)
Ease of access to loans index	424.6	
	(585.9)	
Level of Technological Readiness (Pillar 9)		
Firm-level technology absorption index	5,616**	
	(2,418)	
Availability of latest technology index	-2,162***	
	(835.5)	
Quality of Market Size (Pillar 10)		
Domestic market size index		778.3
		(1,168)
Foreign market size index	-1,430	2,067
	(1,689)	(1,656)
Level of Business Sophistication (Pillar 11)		
Local supplier quantity index	-403.5	
	(1,946)	
Local supplier quality index		4,712**
		(2,313)
Level of Innovation (Pillar 12)		
Quality of scientific research institutions index		-2,765*
		(1,517)
Availability of scientists and engineers index	316.2	1,962
	(396.7)	(1,645)
Constant	2,719	-3,757
	(4,172)	(9,167)
Observations	261	261
R-Square	0.5084	0.5849
Number of Country_id2	29	29
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

The findings above are supported by the following observations from descriptive analysis:-
In European countries: it is found that among the first 10 countries with highest FDI inflow average (i.e. United Kingdom, Russia, Germany, Spain, Romania, Poland, France, Turkey, Italy and Netherlands), 8 of them (i.e. United Kingdom, Russia, Germany, Spain, Romania,

Poland, France and Italy) which is equal to 80% are among countries with highest value of segment angular choice (see Charts 2 below). This indicates that countries with higher value of choices are more likely to attract more FDI than countries with low value of choices.

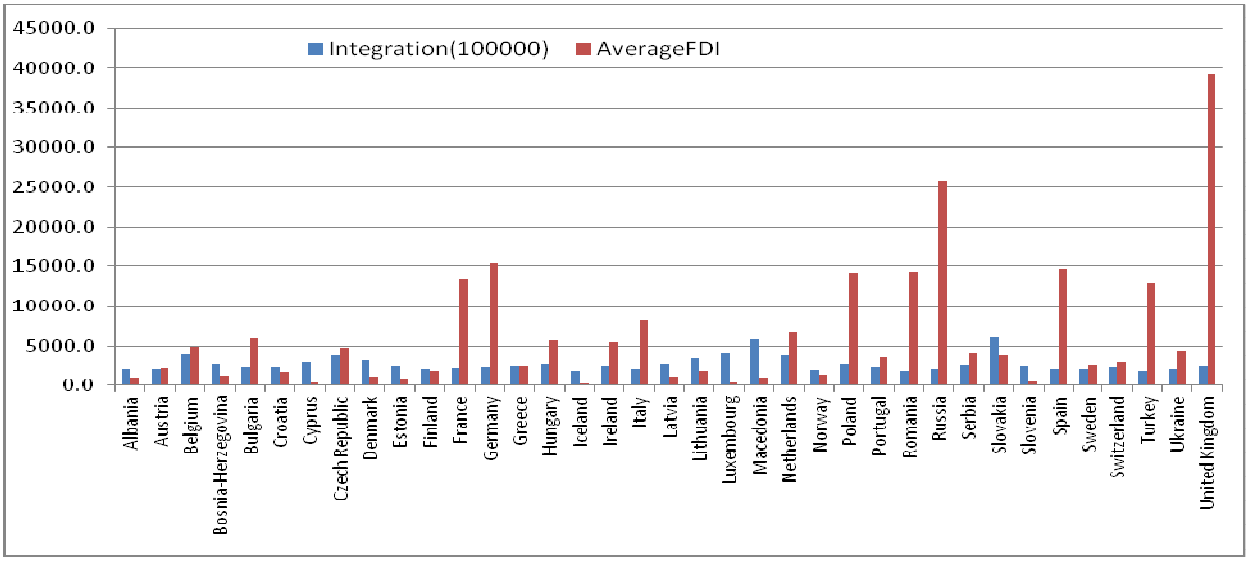
Chart 2: Histograms of average segment angular choice and average FDI inflow (2006-2014) for 37 European countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and average values of segment angular choice by country.

Moreover, the chart 3 below points out that among the 5 countries with relatively higher values of integration like Luxembourg, Macedonia, Slovakia and Czech Republic; neither of them is among the top receipients of total FDI in Europe. This indicates that increase in integration in Europe has negative influence to the inflows of total FDI.

Chart 3: Histograms of average segment angular integration and average FDI inflow (2006-2014) for 37 European countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and average values of segment angular integration by country.

African countries

For African countries, the analysis reveals that both indicators Segment Angular Choice and Segment Angular Integration are significant in influencing the inflows of total FDI in the control of pillars of competitiveness. The presentation of Regression model 1 in table below display that the increase in choices by 1 unit in African countries attract inflows of total FDI by 0.0016% (1.64×10^{-5} units) when there is positive contribution of availability of financial services, firm-level technological absorption, availability of scientists and engineers and domestic market size even if there is negative influence of availability of gross national savings, life expectancy, ease of access to loans, quality of scientific research institutions and quantity of local suppliers (see Regression model 1 in table below).

Moreover, the presentation in Regression model 2 in the table 6 below shows that the increase in integration by 1 unit in African countries increases the inflows of total FDI by 48,808 units when there are positive contribution of availability of financial services and domestic market size even if there are negative contribution of gross national savings, quality of scientific research institutions, foreign market size and quantity of local suppliers (see regression model 2 in table 6 below).

Table 6: Statistical contribution of Choice and Integration in attracting FDI in 32 African countries

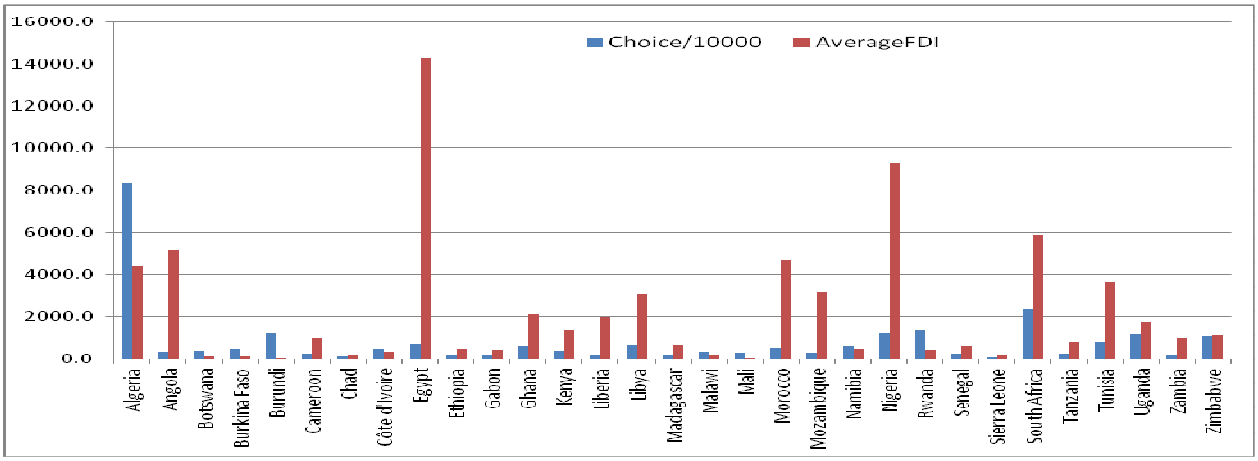
VARIABLES	(1) Total FDI	(2) Total FDI
Depth of Road Networks		
Segment Angular Choice/Betweeness	1.64e-05*	
	(9.48e-06)	
Segment Angular Integration		48,808**
		(20,242)
Macroeconomic Condition (Pillar 3)		
Gross national savings index	-42.19***	-39.31***
	(15.10)	(11.03)
Inflation index	-3.946	2.900
	(2.941)	(3.039)
Health and Primary Education (Pillar 4)		
Life expectancy index	-70.47**	
	(29.91)	
Higher Education and Trainings (Pillar 5)		
Tertiary education enrollment index	20.24	
	(20.28)	
Availability of research & training services index		527.8
		(616.1)
Market Efficiency (Pillar 6)		
Total tax rate index	-0.0643	
	(12.53)	
Trade tariffs index		-6.432
		(41.74)
Financial Market Efficiency (Pillar 8)		
Availability of financial services index	1,622***	1,403***
	(570.3)	(413.4)
Ease of access to loans index	-1,436***	
	(470.4)	
Technological Readiness (Pillar 9)		
Firm-level technology absorption index	992.2*	
	(516.2)	
Innovation (pillar 12)		
Availability of scientists and engineers index	1,507**	448.8
	(643.9)	(637.5)
Quality of scientific research institutions index	-2,236***	-2,922***
	(536.0)	(713.9)
Market Size (Pillar 10)		
Domestic market size index	2,141***	3,330***
	(279.0)	(743.4)
Foreign market size index		-1,155**
		(504.1)
Business Sophistication (Pillar 11)		
Local supplier quality index		217.6
		(823.1)
Local supplier quantity index	-1,185**	-768.8*
	(506.4)	(446.7)
Constant	-605.4	-1,673**
	(515.8)	(703.5)
Observations	279	279
R-Square	0.8634	0.8008
Number of Country_id2	32	32

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The findings above are supported by the following observations from descriptive analysis:-

In African countries: it is found that among the countries with relatively higher values of choices like Algeria, South Africa, Rwanda, Nigeria and Uganda; three countries out of six which is equal to 50% have been the top receipients FDI. Contrary to that, countries like Sierra Leone, Chad, Mali, Malawi and Botswana with relatively lower values of choices also receive relatively less FDI. This indicate that choices influence positively the inflows of total FDI in African countries. Observe chart 4 below:-

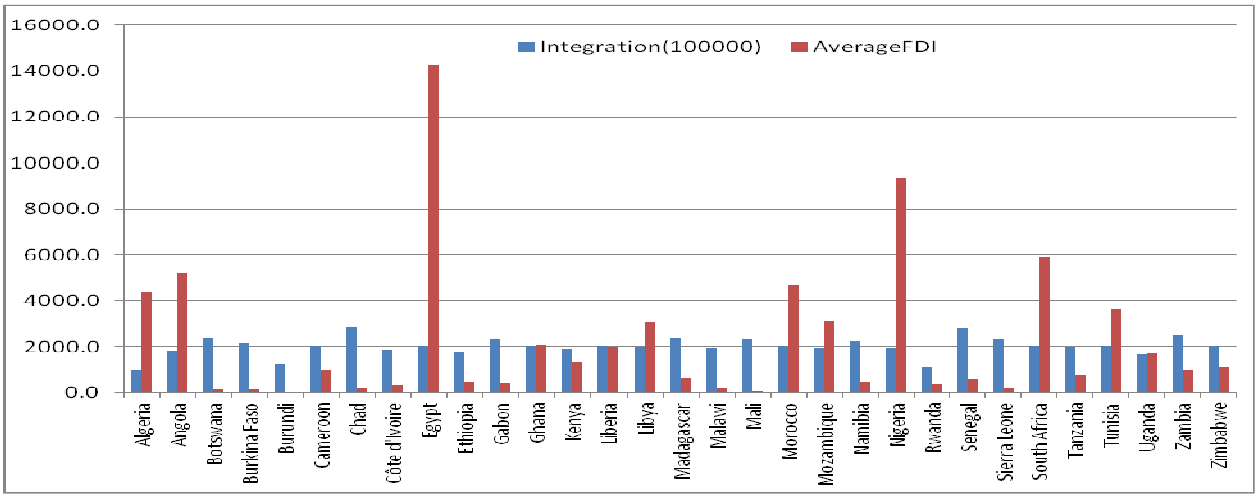
Chart 4: Histograms of average segment angular choice and average FDI inflow (2006-2014) for 32 African countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and average values of segment angular integration by country.

Furthermore, the chart 5 below describe another observation that that among the ten countries with relatively higher values of integration like Botswana, Chad, Burkina Faso, Gabon, Madagascar, Mali, Namibia, Senegal, Sierra Leone and Zambia; five countries out of ten which is equal to 50% (i.e. Botswana, Chad, Burkina Faso, Mali and Sierra Leone) are among the least receipients of total FDI. This indicate that integration influence positively the inflows of total FDI in African countries contrary to Europe where it influences negatively.

Chart 5: Histograms of average segment angular integration and average FDI inflow (2006-2014) for 32 African countries.



Source: Author, 2016 based on FDI market data (2006 – 2014) and average values of segment angular integration by country.

East Africa

For East African countries, the analysis reveals that only Segment Angular Integration is significant in influencing the inflows of total FDI in the control of pillars of competitiveness. The presentation of Regression model 2 in table below display that the increase in integration by 1 unit in East African countries attracts inflows of total FDI by 61,235 units when there is positive contribution of availability of financial services even if there is negative influence of ease of access to loans (see Regression model 2 in table 7 below).

Table 7: Statistical contribution of Choice and Integration in attracting FDI in 5 East African countries

VARIABLES	(1) Total FDI	(2) Total FDI
Depth of Road Networks		
Segment Angular Choice/Betweeness	5.14e-06	
	(8.94e-05)	
Segment Angular Integration		61,235***
		(17,795)
Macroeconomic condition (Pillar 3)		
Macroeconomic environment catalyst index	142.8	152.6
	(691.1)	(543.4)
Health and Primary Education (Pillar 4)		
Health catalyst index	-20.99	
	(17.40)	
Life expectancy index		42.14
		(35.25)
Higher Education and Trainings (Pillar 5)		
Tertiary education enrollment index	199.0	
	(163.5)	
Market Efficiency (Pillar 6)		
Market efficiency burden index		37.27
		(81.05)
Trade tariffs index	-515.6**	
	(239.8)	
Total tax rate index	43.04**	
	(21.23)	
Market size (Pillar 10)		
Market size catalyst index	987.5	
	(624.4)	
Technological readiness (Pillar 9)		
Availability of latest technology index	39.27	
	(141.7)	
Labor Efficiency (Pillar 7)		
Labor market catalyst index		19.60
		(158.4)
Financial Efficiency (Pillar 8)		
Ease of access to loans index		-1,778***
		(482.5)
Availability of financial services index		1,827***
		(390.2)
o._cons	0	
	(0)	
Constant		-6,169**
		(2,467)
Observations	45	45
	1	1
Number of country_id2	5	5

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

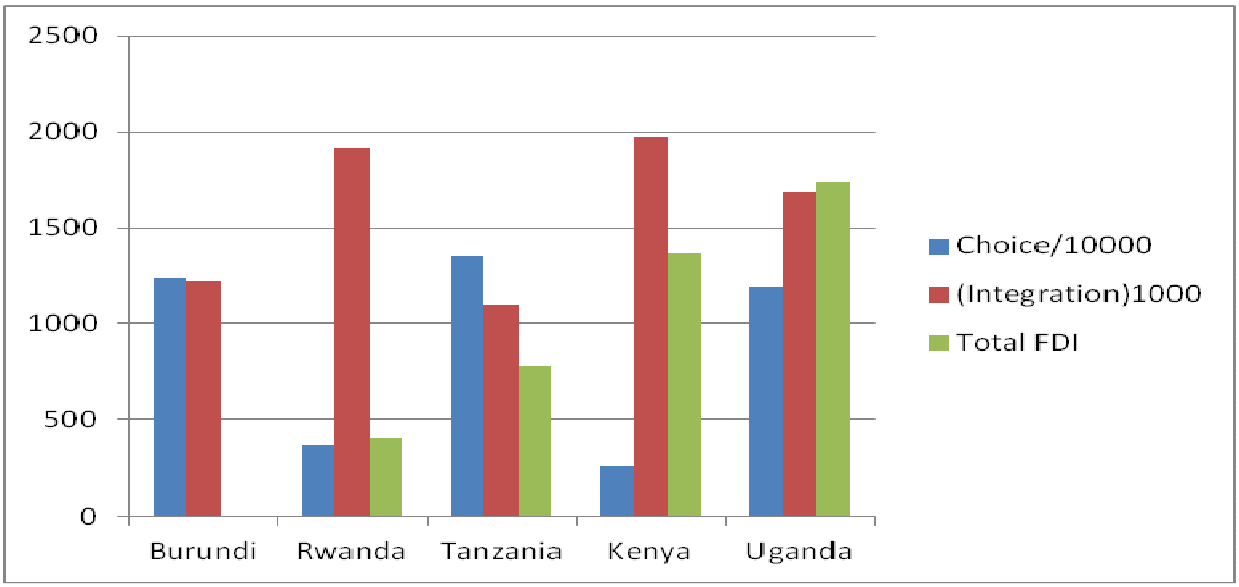
Moreover, the presentation in Regression model 1 in the table below shows that the increase in choice by 1 unit in East African countries has no effect to the inflows of total FDI even if

there are positive contribution of total tax rate and negative contribution of trade tariffs (see regression model 1 in table 7 above).

The findings above are supported by the following observations from descriptive analysis:-

In East African countries: it is found that due to inadequate roads networks, the choice from road network are low. Being the case, there are low passing flows which consequently make the areas not busier, a condition which does not favour FDI inflows. This indicate why segment angular choice has no impact to FDI inflows in East Africa contrary to Europe and Africa where it influences positively. For the case of segment angular integration, it is found that the road networks have increased degree of integration because the region is small. Hence the same inadequate road networks in terms of choice appear significant in lowering distances from one place to all other places, this increases degree of integration and by so doing favours inflows of FDI. However, the flow of FDI in East Africa is not only influenced by infrastructure, that is why the findings can partially be explained by infrastructure and partially not; other factors which influence positively or negatively include political stability, availability of natural resources and maarket size. That is why country like Rwanda and Burundi with high integration but receive meager FDI. Observe chart 4 below:-

Chart 6: Average segment angular choice, integration and average FDI inflow (2006-2014) for 5 countries



Source: Author, 2016 based on FDI market data (2006 – 2014), average values of segment angular choice and integration by country.

4.2.2 The impact of physical infrastructure stock on FDI inflow in Europe, Africa and East Africa

Sub-question 2: *What is the impact of physical infrastructure stock on:-*

a) Inflows of FDI in African and European countries?
b) Inflows of FDI in East African region?

It is proposed that availability of non-excludable physical infrastructure lowers the cost of private firms even if there is no direct role of infrastructure in the production of private firms

(Haughwout, 2001). This is because availability of efficient physical infrastructure stock raises both competitiveness and location advantage of a place over other places and therefore attract more FDI inflows (Ahmad, Ismail, & Nordin, 2015; E. Asiedu, 2004; Assunção, Forte, & Teixeira, 2013; Bakar, Che Mat, & Harun, 2012; Bevan & Estrin, 2004; Castro, 2008; E. Demirhan & Masca, 2008b; Dunning, 1988; Fung et al., 2005; Harzing & Giroud, 2014) as poor physical infrastructure causes an increase in transaction cost and limit access to both local and global markets which ultimately discourages FDI inflows in a host country (Iwanow & Kirkpatrick, 2006).

Generation of indices for physical infrastructure stock

The question above is answered by using the findings obtained from descriptive and inferential analyses while assessing the cumulative impact of physical infrastructure stock (road network in use, rail lines in use, available port services, available air transportation service, available electricity supply service, mobile telephone service usage and fixed internet broadband usage) in attracting totalFDI in a particular country.

The analyses describe graphical relationship and statistical correlation between amounts of FDI inflows in a particular period of time against value of physical infrastructure stock during the same period of time. For the purpose of this study, physical infrastructure stock of a country is indicated by two different indices (physical infrastructure index one including and the other excluding internet), hence computation of these indices were done by using 7 and 6 indicators which form physical infrastructure namely quality of roads index, quality of railway index, quality of port services index, quality of air transportation services index, quality of electricity supply service, number of mobile telephone subscriptions per 100 people and number of fixed internet broadband subscription. This computation of the physical infrastructure indices used the P2 distance index and a synthetic index that combines all of the required indicators into a single value (Garcia et al., 2015). This approach has also been used to build synthetic indicators in other disciplines such as well-being and other social indicators (Garcia et al, 2015). The indicators/indices obtained from computations for all countries are shown in table 8 below:-

Table 8: Computed indices for physical infrastructure stock when including and excluding internet by country

Na.	Country	Infra index withoutICT	Infra index withICT	Country	Infra index withoutICT	Infra index withICT
1	Albania	1.783	1.838	Algeria	2.848	3.985
2	Austria	4.669	6.496	Angola	2.324	0.132
3	Belgium	5.666	6.759	Botswana	2.956	2.668
4	Bosnia-Herzegovina	1.727	2.991	Burkina Faso	1.923	2.014
5	Bulgaria	3.086	3.575	Burundi	1.802	1.508
6	Croatia	3.338	4.503	Cameroon	2.130	1.766
7	Cyprus	4.614	5.573	Chad	1.382	1.284
8	Czech Republic	3.586	5.505	Côte d'Ivoire	5.145	4.144
9	Denmark	5.872	7.275	Egypt	3.566	4.882
10	Estonia	4.625	5.520	Ethiopia	1.841	2.665
11	Finland	5.588	6.942	Gabon	3.587	0.225
12	France	5.659	6.726	Ghana	4.328	0.225
13	Germany	5.910	6.828	Kenya	2.831	3.561
14	Greece	4.218	4.876	Liberia	0.000	0.012
15	Hungary	3.208	4.865	Libya	2.296	0.170
16	Iceland	5.357	7.091	Madagascar	2.205	2.130
17	Ireland	4.066	5.564	Malawi	3.208	0.027

18	Italy	3.335	5.372	Mali	1.663	1.808
19	Latvia	3.971	4.898	Morocco	3.486	3.912
20	Lithuania	3.904	5.232	Mozambique	2.458	2.948
21	Luxembourg	4.437	6.582	Namibia	4.532	3.240
22	Macedonia	2.209	3.491	Nigeria	2.636	4.514
23	Netherlands	5.971	7.155	Rwanda	3.476	0.014
24	Norway	4.224	4.740	Senegal	4.594	0.129
25	Poland	5.002	5.348	Sierra Leone	2.809	0.000
26	Portugal	4.559	5.937	South Africa	4.212	9.978
27	Romania	3.028	3.463	Tanzania	2.902	3.145
28	Russia	3.146	2.988	Tunisia	4.346	4.186
29	Serbia	0.000	0.000	Uganda	1.853	1.995
30	Slovakia	3.360	5.005	Zambia	2.315	2.963
31	Slovenia	4.321	5.628	Zimbabwe	2.514	1.884
32	Spain	4.754	5.865			
33	Sweden	5.220	6.729			
34	Switzerland	5.120	6.931			
35	Turkey	3.133	3.819			
36	Ukraine	3.035	3.079			
37	United Kingdom	5.135	6.707			

Source: Global Competitiveness Index (2013-2014) Report.

Findings about relationship between physical infrastructure indices and inflow of FDI

The analysis to describe relationship between the variables is done by using FDI inflow data for the period of 9 years (2006 – 2014), physical infrastructure indices (with and without internet) as shown in the table above and eleven pillars of competitiveness (Quality of institutions (Pillar 1), Macroeconomic condition (Pillar 3), Quality of health and primary education (Pillar 4), Quality of higher education and trainings (pillar 5), Market goods efficiency (pillar 6), Labor market efficiency (Pillar 7), Financial market efficiency (Pillar 7), Technological readiness (Pillar 9), Market size (Pillar 10), Business sophistication (Pillar 11) and Innovation (Pillar 12).

When inferential analysis was done by using the above variables; the findings were as follows:-

<u>In Europe</u>

Basing on the analysis conducted in 29 countries, it is found that the physical infrastructure index in absence of internet services (model 1) is positively significant in attracting total FDI when both domestic and foreign market sizes are positively significant while life expectancy, quality of scientific research institutions and availability of financial services are negatively significant. Analysis from the table below predicts that improvement of physical infrastructure stock in the absence of internet services by 1 unit influences growth of total FDI inflows by 1,456 units in the condition that growth of domestic and foreign markets have positive influence to the inflows of total FDI while quality of scientific research institutions, availability of financial services and life expectancy have negative influence to the inflows of total FDI (see Table 9 below on Regression model 1).

Moreover, it is found that the physical infrastructure index in presence of internet services (model 2) is positively significant in attracting totalFDI when both domestic and foreign market sizes are positively significant while cooperation in labour, life expectancy and availability of financial services are negatively significant. Analysis from the table (model 2) below predicts that improvement of physical infrastructure stock in the presence of internet services by 1 unit influences growth of total FDI inflows by 1,006 units when there is

positive contribution of domestic and foreign market sizes and negative influence of cooperation in labour, life expectancy and availability of financial services (see Table 9 below on Regression model 2).

Table 9: Statistical impact of physical infrastructure stock in attracting FDI in 29 European countries

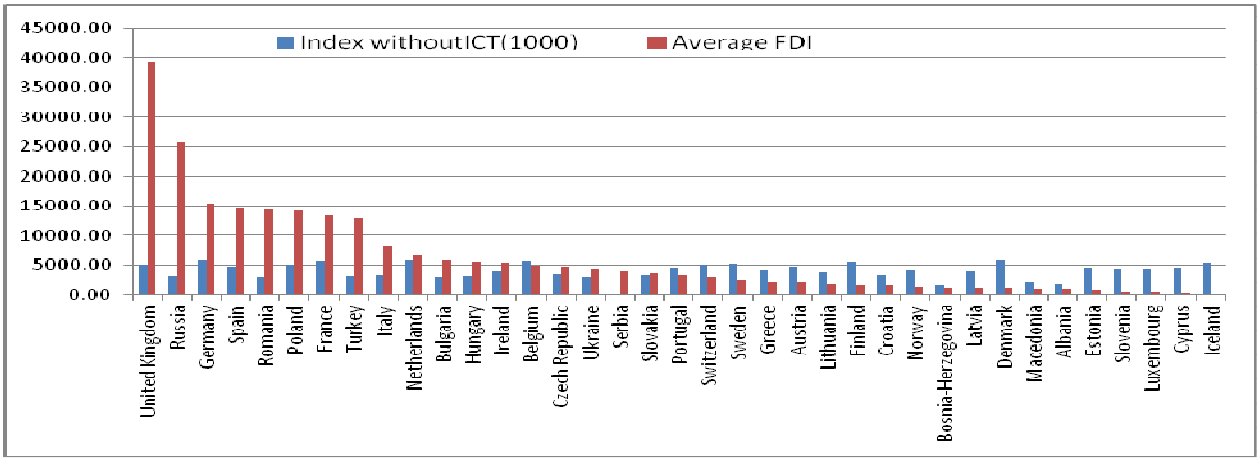
VARIABLES	(1) Total FDI	(2) Total FDI
Efficiency of Physical Infrastructure Stock		
Physical infrastructure index (excluding Internet)	1,456*	
	(746.7)	
Physical infrastructure index (including Internet)		1,006*
		(571.3)
Labor Market Efficiency (Pillar 7)		
Cooperation in labor index		-4,232*
		(2,561)
Macroeconomic Condition (Pillar 3)		
Gross national savings index	35.03	6.500
	(118.7)	(92.85)
Inflation index		-237.2
		(144.4)
Quality of Health and Primary Education (Pillar 4)		
Life expectancy index	-161.2*	-131.3*
	(85.19)	(77.95)
Quality of institutions (Pillar 1)		
Strength of investor protection index	484.2	436.0
	(434.0)	(417.0)
Business cost of crime and violence index	-1,758	-1,173
	(1,543)	(1,639)
Goods Market Efficiency (Pillar 6)		
Trade tariffs index	446.3	474.7
	(372.3)	(367.2)
Total tax rate index	-86.11	-98.69
	(67.02)	(73.85)
Market Size (Pillar 10)		
Domestic market size index	4,354***	3,691**
	(1,596)	(1,514)
Foreign market size index	2,573**	3,976***
	(1,241)	(1,472)
Quality of Higher Education and Trainings (Pillar 5)		
Availability of research and training services index	-64.28	-77.06
	(73.72)	(65.88)
Level of Innovation (Pillar 12)		
Availability of scientists and engineers index	320.5	439.9
	(581.6)	(546.8)
Quality of scientific research institutions index	-3,143**	317.8
	(1,454)	(1,609)
Financial Market Efficiency (Pillar 8)		
Availability of financial services index	-2,013**	-2,184**
	(864.0)	(959.0)
Ease of access to loans index	321.7	437.3
	(747.5)	(823.1)
Business Sophistication (Pillar 11)		
Local supplier quantity index	829.3	
	(1,498)	
Constant	5,048	9,404**
	(5,381)	(4,791)
Observations	261	261
R-Square	0.6222	0.5481
Number of Country_id2	29	29
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

The findings above can also be supported by the following observations from descriptive analysis:-

Discussion 1:

Among the 37 European countries which this study covers, the first top ten countries with relatively highest average FDI inflow (i.e. United Kingdom, Russia, Germany, Spain, Romania, Poland, France, Turkey, Italy and Netherlands), six of them which is equal to 60% are among countries with relatively highest value of physical infrastructure index without ICT (i.e. United Kingdom, Germany, Spain, Poland, France and Netherlands). On addition to that among the last ten countries with relatively lowest average FDI inflow (Iceland, Cyprus, Luxembourg, Slovenia, Estonia, Albania, Macedonia, Denmark, Latvia and Bosnia-Herzegovina), 3 of them which is equal to 30% (i.e. Albania, Macedonia and Bosnia-Herzegovina) are among the countries with relatively lowest value of physical infrastructure index without ICT (see Charts 7 below).

Chart 7: Histograms of physical infrastructure index without internet (ICT) against average FDI inflow (2006-2014) for 37 European countries.

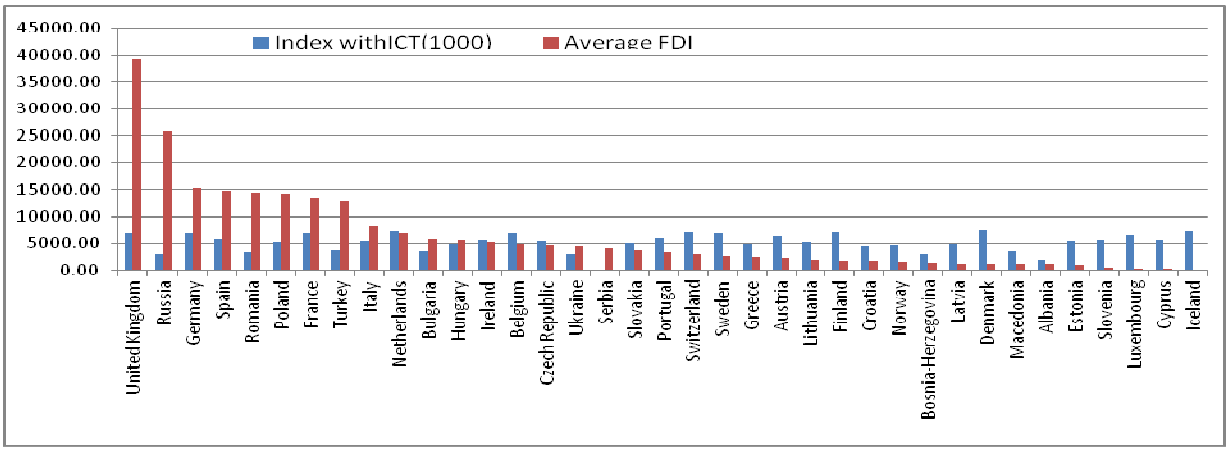


Source: Author, 2016 based on FDI market data (2006 – 2014) and physical infrastructure index without ICT by country.

Discussion 2:

Also it is observed that among 37 European countries which this study covers, the first top eleven with relatively higher values of physical infrastructure index with ICT like United Kingdom, Spain, Germany, France, Switzerlands, Belgium, Sweden, Finland, Denmark, Luxembourg and Netherlands; 55% of them which is equal to to six countries (i.e. United Kingdom, Spain, Germany, France, Belgium and Netherlands) are the leading receipients of FDI. Observe chart 8 below:-

Chart 8: Histograms of physical infrastructure index with internet (ICT) against average FDI inflow (2006-2014) for 37 European countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and physical infrastructure index with ICT by country.

Conclusion for European countries: This indicates that the quality of physical infrastructure stock without/with internet is crucial for the inflow of FDI in European countries. Thus, European countries with relatively highest value of physical infrastructure index with/without ICT receive more FDI because adequate physical infrastructure stock (roads network, rail lines, port services, air transportation, electricity supply, mobile telephone services and fixed internet services) facilitate FDI operations at low production cost and market accessibility hence maximize FDI business profits.

In Africa

Basing on the analysis conducted in thirty two countries out of fifty four, it is found that the physical infrastructure index in absence of internet services (model 1) is positively significant in attracting total FDI when domestic market size, availability of financial services and availability of scientists and engineers are positively significant while business cost of crime and violence, ease of access to loans and quality of local suppliers are negatively significant. Analysis from the table below predicts that improvement of physical infrastructure stock in the absence of internet services by 1 unit influences growth of total FDI inflows by 491 units when there are positive contribution of availability of financial services, domestic market size and availability of scientists and engineers even if there are negative contribution of business cost of crime and violence, ease of access to loans and quality of local suppliers (see Table 10 below on Regression model 1).

Moreover, it is found that the physical infrastructure index in presence of internet services (model 2) is positively significant in attracting totalFDI when domestic market sizes is positively significant while total tax rate is negatively significant. Analysis from the table (model 2) below predicts that improvement of physical infrastructure stock in the presence of internet services by 1 unit influences growth of totalFDI inflows by 253.9 units when there is positive contribution of domestic market size even if there is negative contribution of total tax rate (see Table 10 below on Regression model 2).

Table 10: Statistical impact of physical infrastructure stock in attracting FDI in 32 African countries

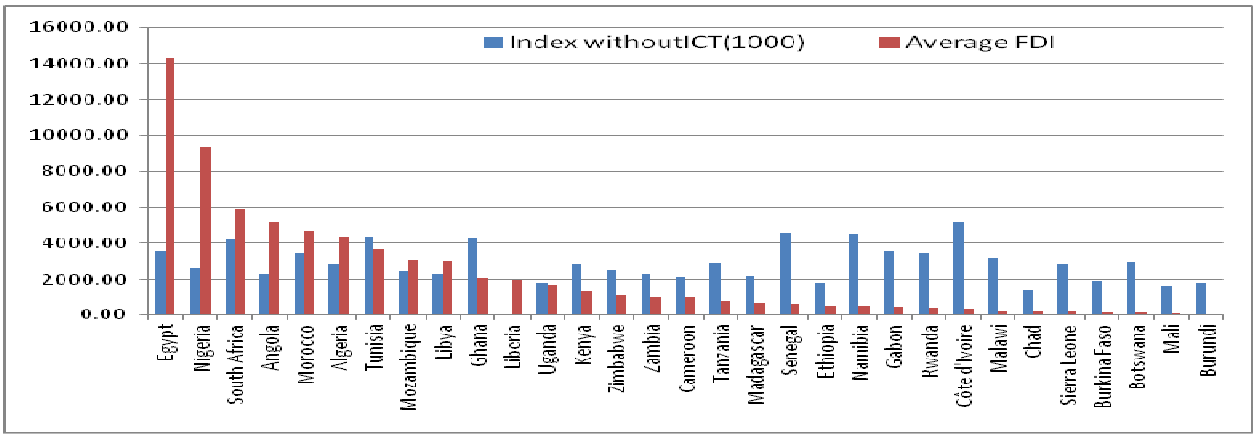
VARIABLES	(1) Total FDI	(2) Total FDI
Efficiency of Physical Infrastructure Stock		
Physical infrastructure index (excluding Internet)	491.0**	
	(228.3)	
Physical infrastructure index (including Internet)		253.9**
		(106.4)
Quality of Institutions (Pillar 1)		
Strength of investor protection index	-74.32	-79.59
	(129.4)	(133.7)
Business cost of crime and violence index	-330.7*	18.03
	(190.1)	(81.28)
Macroeconomic Condition (Pillar 3)		
Gross national savings index	-22.09	-10.17
	(13.59)	(17.13)
Inflation index	-4.049	5.033
	(3.405)	(3.184)
Quality of Higher Education and Trainings (Pillar 5)		
Tertiary education enrollment index	3.105	
	(19.74)	
Availability of research and training services index	-951.9	
	(626.5)	
Goods Market Efficiency (Pillar 6)		
Trade tariffs index	10.56	32.86
	(44.16)	(33.94)
Total tax rate index		-34.80*
		(19.79)
Financial Market Efficiency (Pillar 8)		
Ease of access to loans index	-2,014***	
	(593.6)	
Availability of financial services index	1,611**	-596.2
	(791.7)	(653.3)
Market Size (Pillar 10)		
Domestic market size index	1,830***	2,023***
	(368.9)	(500.1)
Technological Readiness (Pillar 9)		
Availability of latest technology index	291.9	-362.3
	(767.9)	(1,048)
Firm-level technology absorption index		365.6
		(871.3)
Business Sophistication (Pillar 11)		
Local supplier quality index	-1,510**	
	(676.7)	
Level of Innovation (Pillar 12)		
Availability of scientists and engineers index	1,227*	-145.6
	(722.5)	(481.5)
Constant	-1,292	-946.5*
	(1,036)	(555.0)
Observations	279	279
R-Square	0.8054	0.6892
Number of Country_id2	32	32
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

The findings above can also be supported by the following observations from descriptive analysis:-

Discussion 3:

Among the 32 African countries which this study covers; it is pointed out that African countries with relatively higher values physical infrastructure index without ICT like Cote d'Ivoire, Namibia, Senegal, Ghana, Tunisia, South Africa, Morocco, Gabon and Rwanda; four of them (i.e. Egypt, South Africa, Morocco and Tunisia) are among the top most receipients of FDI in Africa. Moreover, countries like Chad and Mali which have lowest values of physical infrastructure index are also among the least receipients of FDI (see Chart 9 below).

Chart 9: Histograms of physical infrastructure index without internet (ICT) against average FDI inflow (2006- 2014) for 32 African countries

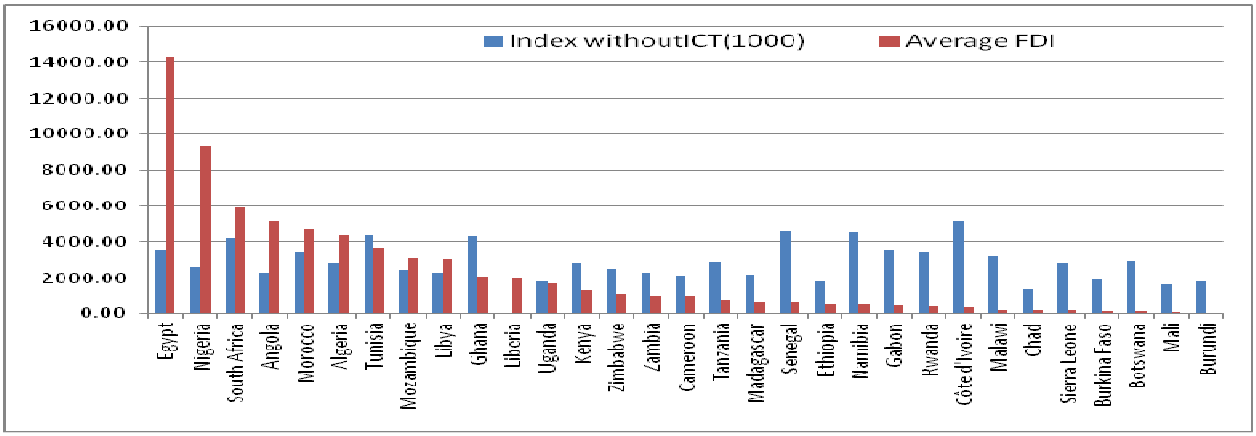


Source: Author, 2016 based on FDI market data (2006 – 2014) and physical infrastructure index without ICT by country.

Discussion 4:

Also among the 32 African countries which this study covers; it is pointed out that of ten African countries (i.e. Egypt, Nigeria, South Africa, Morocco, Algeria, Tunisia, Kenya, Namibia, Cote d'Ivoire and Mozambique) with relatively higher values physical infrastructure index with ICT; seven countries out of ten which is equal to 70% (i.e. Egypt, Nigeria, South Africa, Morocco, Algeria, Tunisia and Mozambique) are the top most receipients of FDI. Moreover, countries like Sierra Leone and Malawi with lowest values for physical infrastructure with ICT are among the least receipients of FDI in Africa. See chart 10 below

Chart 10: Histogram of physical infrastructure index with internet (ICT) against average FDI inflow (2006- 2014) for 32 African countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and physical infrastructure index with ICT by country.

Conclusion for African countries:

This results indicates that the quality of physical infrastructure stock without/with internet is crucial for the inflow of FDI in African countries. Thus, African countries with relatively highest value of physical infrastructure index with/without ICT receive more FDI because adequate physical infrastructure stock (roads network, rail lines, port services, air transportation, electricity supply, mobile telephone services and fixed internet services) facilitate FDI operations at low production cost and market accessibility hence maximize FDI business profits.

Overall Conclusion (Europe and Africa):

The comparison from the statistical findings for Europe and Africa propose that both indices for physical infrastructure stock (one in absence/the other in presence of internet services) predict more inflows of foreign investments in European countries than in African countries. This is because European countries have relatively high level adequacy and efficiency of physical infrastructure stock as compared to African countries, that is why the models for Europe and Africa predict that improvements of physical infrastructure stock in absence of internet services in European and African countries by 1 unit do influence the inflows of total FDI by 1,456 units and 491 units respectively while improvements of physical infrastructure stock in presence of internet services in European and African countries by 1 unit do influence inflows of total FDI by 1,006 units and 253.9 units respectively when other factors remain constant (see Regression tables 9 & 10 for European and African countries respectively).

In East Africa:

Basing on the analysis conducted in five countries out of six, it is found that the physical infrastructure index in presence of internet services (model 1) influences the inflows of total FDI in control of quality of institutions, macroeconomic condition and market efficiency. Analysis from the table (model 1) below predicts that improvement of physical infrastructure stock in the presence of internet services by 1 unit influences growth of total FDI inflows by 3,999 units when there is positive contribution of business cost of crime and violence, inflation and trade tarriffs even if there is negative influence of strength of investors' protection, gross national savings and total tax rate (Table 11 below on Regression model 1).

Moreover, physical infrastructure index in absence of internet services (model 2) influences the inflows of total FDI in control of macroeconomic condition, higher education and trainings and market efficiency. Analysis from the table below predicts that improvement of physical infrastructure stock in the absence of internet services by 1 unit influences growth of total FDI inflows by 115.6 units when there are positive contribution of gross national savings, inflation, tertiary education enrollment and availability of research and training services even if there is negative influence of total tax rate (see Table 11 below on Regression model 2).

Table 11: Statistical impact of physical infrastructure stock in attracting FDI in East African countries

VARIABLES	(1) Total FDI	(2) Total FDI
Efficiency of physical infrastructure stock		
Physical infrastructure index (excluding internet)		115.6***
		(0)
Physical infrastructure index (including internet)	3,999***	
	(4.64e-08)	
Quality of Institutions (Pillar 1)		
Strength of investor protection index	-1,897***	
	(2.44e-08)	
Business cost of crime and violence index	2,093***	
	(2.59e-08)	
Macroeconomic condition (Pillar 3)		
Gross national savings index	-244.1***	59.34***
	(3.21e-09)	(0)
Inflation index	1,024***	50.11***
	(1.12e-08)	(0)
Higher Education and Trainings (Pillar 5)		
Tertiary education enrollment index		14.82***
		(0)
Availability of research and training services index		438.4***
		(0)
Market Efficiency (Pillar 6)		
Trade tariffs index	3,932***	
	(4.40e-08)	
Total tax rate index	-1,144***	-51.56***
	(1.29e-08)	(0)
o._cons	0	0
	(0)	(0)
Observations	45	45
R-Square	1	1
Number of country_id2	5	5
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

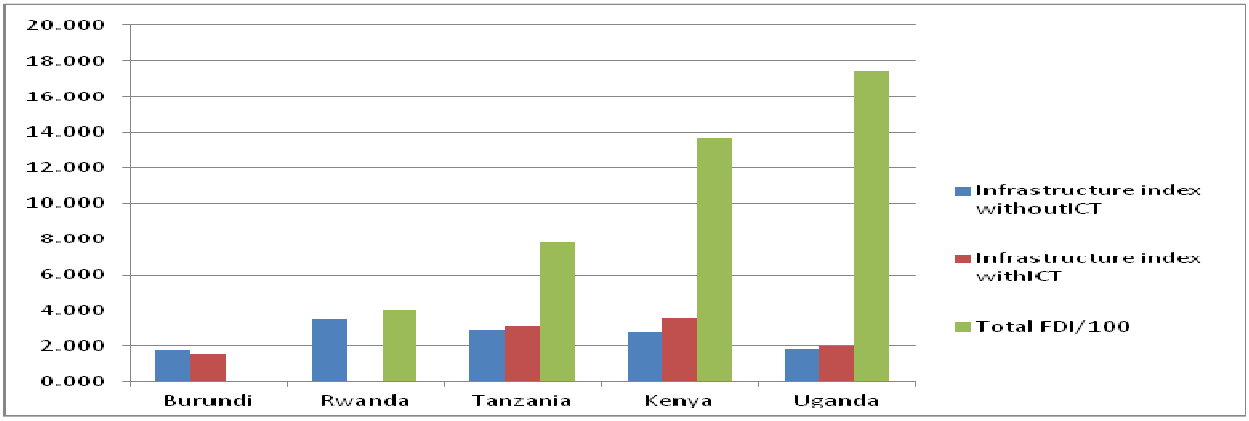
The findings above can also be supported by the following observations from descriptive analysis:-

Discussion 1:

Among the five East African countries which this study covers; it is pointed out that it is Kenya and Tanzania which have higher indices for both physical infrastructure with ICT and

physical infrastructure without ICT; however Uganda with moderately low quality of such infrastructure received more FDI during 2006 – 2014 than other East African countries. This is because during that period, Uganda has attracted FDI in extraction sector due to discoveries of oil deposits in the country. See chart 11 below

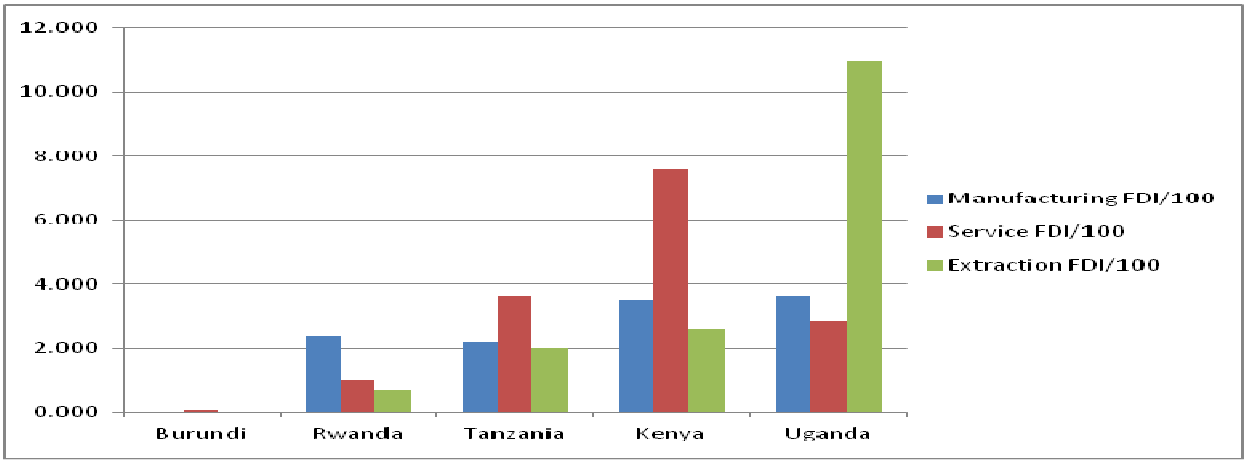
Chart 11: Histogram of physical infrastructure index with/ without ICT against average FDI inflow (2006-2014) for 5 East African countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and GCI data (2013-2014)

However, the normal trend of FDI inflows in East Africa which is lead by service sector shows that Kenya is the leading one (see Chart 12 below). This shows that when all factors are constant, FDI flow to a place where its operations are guaranteed for easy access of markets and movements of factors of production due to presence of physical infrastructure.

Chart 12: Histograms of average inflows of FDI (2006- 2014) in the three leading sectors in East African countries



Source: Author, 2016 based on FDI market data (2006 – 2014)

Conclusion:

The above findings indicates that the quality of physical infrastructure stock without/with internet is crucial for the inflow of FDI in East African countries when all other factors remain constant. East African countries with relatively lowest value of physical infrastructure index with/without ICT may attract more FDI due to other factors like availability of natural

resources. Moreover, it is shown that the physical infrastructure stock with internet service has greater positive influence in attracting FDI in East Africa.

4.2.3 The influence of specific physical infrastructure on FDI inflow in Europe, Africa and East Africa

Sub-question 3: *To what extent does specific physical infrastructure influence:-*

a) *Inflow of FDI in African and European countries?*
b) *Inflow of Manufacturing FDI, Service FDI and Extraction FDI in East African countries?*

In this study, the physical infrastructure stock is composed of seven types of infrastructure namely road network, length of rail lines, port services, air transportation, electricity supply, access to mobile telephone subscription and fixed broadband internet subscription. Therefore, the focus of the research sub-questions above is to find out the influence of specific physical infrastructure in attracting inflows of foreign investments in European, African and specifically East African countries.

Selection of indices for FDI inflows and specific physical infrastructure

The question above is answered by using the findings obtained from inferential and descriptive analyses while assessing the influence of specific type of physical infrastructure (i.e. road network in use, rail lines in use, available port services, available air transportation service, available electricity supply service, mobile telephone service usage and fixed internet broadband usage) in attracting Greenfield foreign investments in a particular country. For European countries, FDI in transport sector were used. This is because under normal circumstances European countries are saturated with investments, thus in order to examine the influence of single set of infrastructure the use of FDI data which is still growing was important, hence the choice of FDI inflows in transport sector. For African countries, FDI in manufacturing sector were used. This is because flow of foreign investments in this sector is very important for economic development of African countries and continent at large although the current trend shows investments in this sector have been shrinking due to the growth of service sector which has been attracting more investments and consequently threaten the growth of manufacturing sector and economic growth in Africa.

The index values for all specific physical infrastructures (road network; rail lines; port service; air transportation; electricity supply; access to mobile telephone and access to internet services) were obtained from Global Competitiveness Index (2006-14) data. These indices are used in many social science researches especially the ones which focus in economic growth and improvements in other issues related to social welfare. Moreover, for about a decade now the World Economic Forum has been using indices from Global Competitiveness Reports which publish new indices in every year as Global Competitiveness Index data which measure performance of different sectors in economic growth and productivity of economy. Since this study aim to explain the influence of surface transportation, air transportation, reliable electric supply and telecommunication services; indices for quality of road network, quality of railway infrastructure, quality of port infrastructure, quality of air transportation infrastructure, quality of electricity supply, number of mobile telephone subscriptions and number of fixed internet broadband subscriptions were selected to represent specific physical infrastructure for the period of 2006 – 2014 for 32 African and 37 European countries.

Therefore, the model applied amounts of FDI inflows (in USD) for the period of 9 years (2006 – 2014) as dependent variable, indices of specific physical infrastructures (i.e. quality of road network, quality of railway infrastructure, quality of port infrastructure, quality of air transportation infrastructure, quality of electricity supply, number of mobile telephone subscriptions and number of fixed internet broadband subscriptions) and other 11 pillars of competitiveness (Quality of institutions (Pillar 1), Macroeconomic condition (Pillar 3), Quality of health and primary education (Pillar 4), Quality of higher education and trainings (pillar 5), Market goods efficiency (pillar 6), Labor market efficiency (Pillar 7), Financial market efficiency (Pillar 7), Technological readiness (Pillar 9), Market size (Pillar 10), Business sophistication (Pillar 11) and Innovation (Pillar 12) from GCI data (2006 – 2014) as independent variables

When inferential analysis was done by using the above variables; the findings were as follows:-

In Europe:

Basing on the analysis conducted in 37 countries, it is found that with exception of quality of electricity supply infrastructure; all other specific physical infrastructure namely quality of road networks, quality of railway, quality of port, quality of air transportation, number of mobile subscriptions and number of fixed internet subscriptions were significant in control of pillars of competitiveness (see Regression models 1, 2, 3, 4, 5, 6 and 7 in the table 12 below).

Table 12: Regression results of specific infrastructure and pillars of competitiveness against transportation FDI in 37 European countries for the period of 2006-2014

VARIABLES	(1) ACTtraFDI	(2) ACTtraFDI	(3) ACTtraFDI	(4) ACTtraFDI	(5) ACTtraFDI	(7) ACTtraFDI	(8) ACTtraFDI
Efficiency and adequacy of Road network							
Quality of roads index	108.3*						
	(60.45)						
Efficiency and Length of Rail lines							
Quality of Rail lines index		-67.93***					
		(23.84)					
Efficiency of Port services							
Quality of port services index			-65.01**				
			(27.28)				
Efficiency of Air transportation services							
Quality of Air transportation index				154.5**			
				(76.51)			
Efficiency of Electricity service							
Quality of electricity supply					25.07		
					(34.12)		
Access to Mobile telephone service							
Number of mobile tel. subscriptions/ 100 pp						-3.200**	
						(1.567)	
Access to Fixed Internet Broadband Services							
Number of fixed internet br. subscriptions							4.150*
							(2.230)
Macroeconomic Condition (Pillar 3)							
Macroeconomic environment catalyst index	94.94*	28.14	39.33	90.71	93.25*	45.03	68.86
	(56.01)	(45.30)	(51.35)	(57.66)	(54.45)	(60.53)	(55.66)
Financial Market Efficiency (Pillar 6)							
Financial market catalyst index	-47.74	-15.83	-25.17	-48.43	-45.98	-54.84	-71.08
	(59.98)	(62.92)	(61.83)	(58.14)	(58.14)	(60.23)	(62.54)
Labor Market Efficiency (Pillar 7)							
Cooperation in labor index	-101.8	-71.35	-78.92	-93.62	-98.83	-112.7	-120.1
	(100.6)	(101.7)	(99.26)	(101.2)	(106.4)	(104.0)	(106.7)
Flexibility of wage determination index	-97.35	-84.48	-88.71	-87.12	-111.1*	-44.82	-69.22
	(64.01)	(61.92)	(63.04)	(66.82)	(58.22)	(80.05)	(63.10)
Market Size (Pillar 10)							
Market size catalyst index	458.3***	585.3***	530.4***	450.7***	457.3***	469.6***	427.3***
	(156.1)	(197.0)	(174.3)	(158.1)	(153.4)	(148.5)	(136.0)
Business Sophistication (Pillar 11)							
Local supplier quantity index	-62.87	-175.7	-124.1	-35.83	-34.01	-101.0	-5.688
	(135.6)	(116.0)	(117.2)	(137.6)	(140.5)	(136.5)	(130.9)
Technological Readiness (Pillar 9)							
Technological readiness catalyst index	-316.0***	-123.1	-185.4**	-312.6***	-231.3**	-193.8*	-282.4**
	(120.2)	(78.72)	(85.47)	(109.7)	(111.1)	(101.5)	(114.1)
Level of Innovation (Pillar 12)							
Innovation catalyst index	-26.32	-6.447	-5.660	-22.19	-26.40*	-30.62*	-37.96**
	(16.56)	(17.28)	(17.58)	(15.83)	(14.86)	(16.21)	(18.28)
Constant	181.6	219.9	476.8	-284.2	179.9	778.3	429.0
	(949.9)	(1,052)	(930.4)	(972.2)	(912.6)	(902.1)	(866.9)
Observations	320	320	320	320	309	320	320
R-Square	0.2184	0.2518	0.2574	0.2205	0.1998	0.3164	0.3025
Number of Country_id2	37	37	37	37	37	37	37

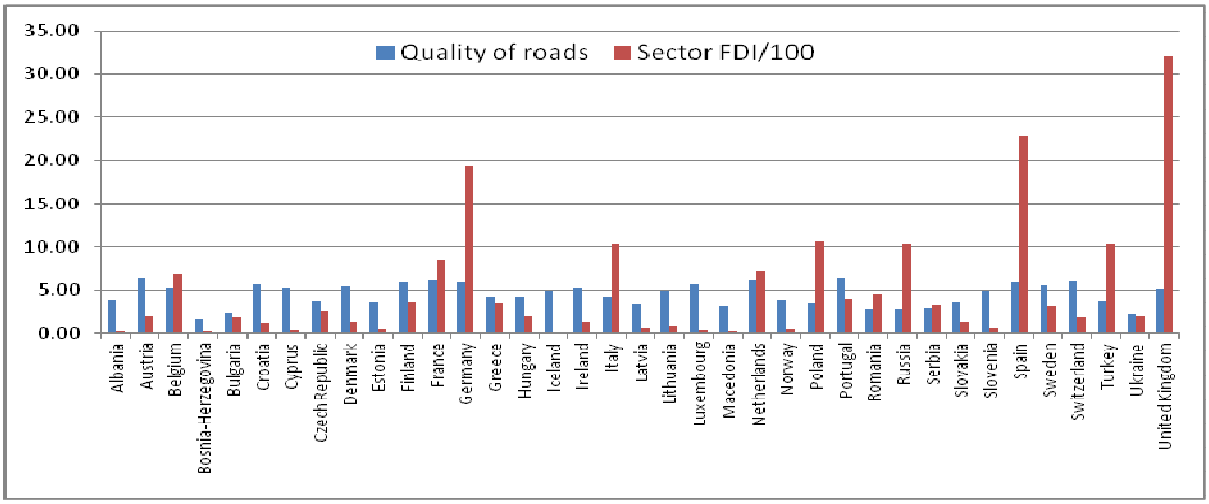
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(a) Impact of quality of road networks

Statistical significance of quality of road networks in use in European countries is presented by Regresion model 1 (***ACTtraFDI 1***) in Table 12 above. It is seen that the improvements in quality of road network in control of macroeconomic condition, market size and technological readiness influences the inflow of FDI in transportation sector among European countries. The presentation reveals that improvements in quality of road network by 1 unit influences the inflow of FDI in transportation sector by 108.3 units when there is positive contribution of macroeconomic condition catalyst and market size even if there is negative influence of technological readiness catalyst.

These findings are in comformity with what is observed when the averages of inflows of FDI in transportation sector and indices for the quality of road network for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 13 below). It is found that among the first 10 countries with relatively highest average FDI inflow in transportation sector (United Kingdom, Spain, Germany, Russia, Poland, Italy, France, Turkey, Belgium and Netherlands), 6 of them are among countries with relatively highest index value for quality of road networks in use (United Kingdom, Germany, Spain, Belgium, France and Netherlands). Meanwhile, among the last 10 European countries with relatively lowest average FDI inflow in transportation sector (Iceland, Macedonia, Cyprus, Luxembourg, Slovenia, Estonia, Albania, Norway, Latvia and Bosnia-Herzegovina), 3 of them are among the countries with relatively lowest index value for quality of road networks (Bosnia-Herzegovina, Albania and Macedonia).

Chart 13: Relationship between amounts of transportation FDI against quality of road network index in 37 European countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and GCI data (2013-2014)

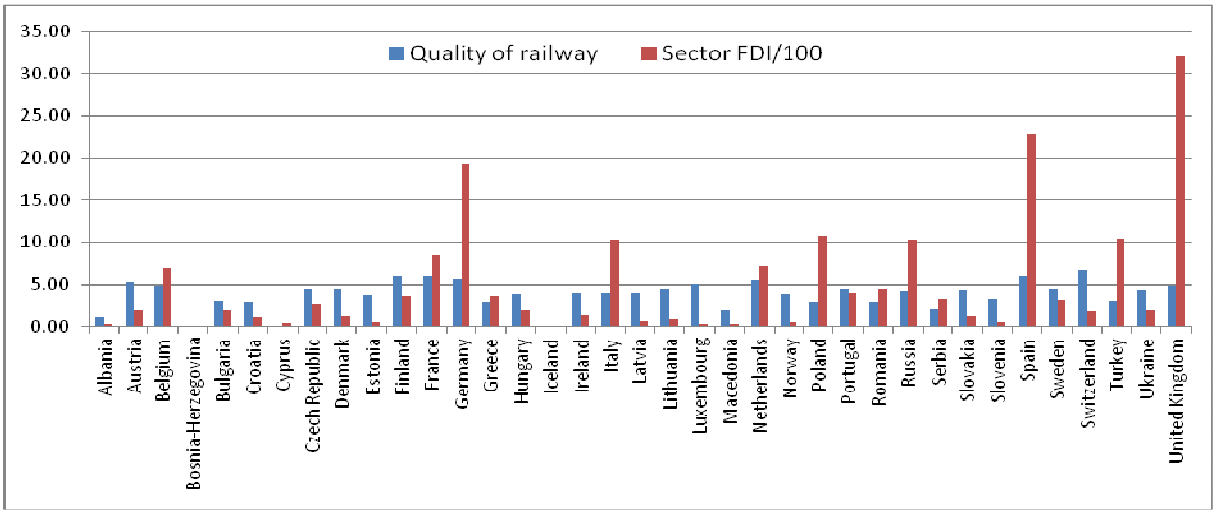
However, there are other countries like Bulgaria and Ukraine with relatively lowest index value for road network but receive moderately high FDI in transportation sector, this is because such countries have other factors which make them competitive in attracting FDI in transportation sector. For other countries like Iceland, Luxembourg and Lithuania with moderate high index for quality of road network but receive relatively low FDI in transportation sector, it is because quality of road network alone in such countries is not sufficient to influence the inflow of FDI in transportation sector; there are other factors like market size, macroeconomic condition and level of technology which are important in European countries to influence inflow of transportation FDI.

(b) Impact of quality of railway infrastructure

Statistical significance of quality of railway in use in European countries is presented by Regresion model 2 (***ACTtraFDI 2***) in Table 12 above. It is seen that the improvements in quality of railway in control of market size reduces inflows of FDI in transportation sector among European countries. The presentation reveals that improvements in quality of railway in use by 1 unit decreases the inflow of FDI in transportation sector by 67.93 units even if there is positive contribution of market size.

These findings are in comformity with what is observed when the averages of inflows of FDI in transportation sector and indices for the quality of railway in use for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 14 below). It is found that among the first 7 European countries with relatively highest average indices for quality of railway in use (i.e. Switzerland, Spain, Netherlands, Germany, France, Finland and Austria), 3 of them (Switzerland, Finland and Austria) are among the countries with relatively low FDI inflows in transportation sector.

Chart 14: Relationship between average amount of transportation FDI against average index value of quality of railway (2006- 2014) in European countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and GCI data (2013-2014)

Meanwhile, among the last 10 European countries with relatively lowest average FDI inflow in transportation sector (Iceland, Macedonia, Cyprus, Luxembourg, Slovenia, Estonia, Albania, Norway, Latvia and Bosnia-Herzegovina), 5 of them (i.e. Slovenia, Norway, Luxembourg, Latvia and Estonia) are among the countries with relatively higher index value for quality of railway in use Bosnia-Herzegovina, Iceland, Cyprus and Albania).

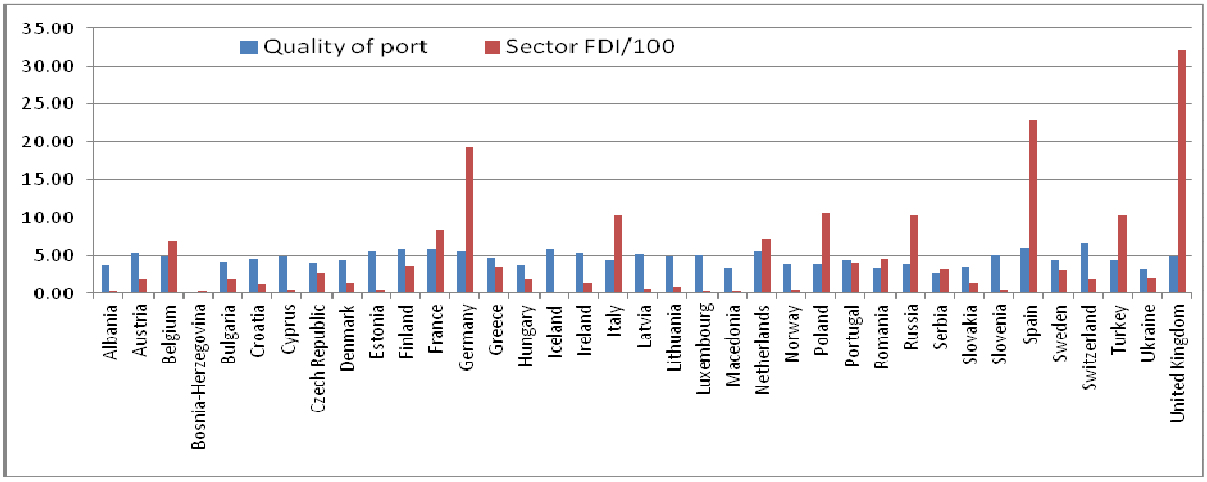
However, there are other countries like United Kingdom, Spain, Germany, France and Netherlands with relatively higher indices for quality of railway in use but are still highest receipients of transportation FDI; this is because such countries have other competitive advantages which despite the negative influence imposed by high quality of railway, they still attract inflows of transportation FDI due to other factors like macroeconomic condition, innovation level and market size.

(c) Impact of quality of port infrastructure

Statistical significance of quality of port infrastructure in use in European countries is presented by Regresion model 3 (***ACTtraFDI 3***) in Table 12 above. It is seen that the improvements in qquality of port infrastructure in control of market size and technological readiness reduces inflows of FDI in transportation sector among European countries. The presentation reveals that improvements in quality of port infrastructure in use by 1 unit decreases the inflow of FDI in transportation sector by 65.01 units when there are positive contribution of market size catalyst and technological readiness catalyst.

These findings are in comformity with what is observed when the averages of inflows of FDI in transportation sector and indices for the quality of port infrastructure in use for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 15 below). It is found that among the first 7 European countries with relatively highest average indices for quality of port infrastructure in use (i.e. Switzerland, Spain, Netherlands, Germany, France, Finland, Estonia, Iceland, Ireland and Austria), 4 of them (Iceland, Estonia, Ireland and Switzerland) are among the countries with relatively low FDI inflows in transportation sector. Meanwhile, among the last 10 European countries with relatively lowest average FDI inflow in transportation sector (Iceland, Macedonia, Cyprus, Luxembourg, Slovenia, Estonia, Albania, Norway, Latvia and Bosnia-Herzegovina), 6 of them (i.e. Iceland, Slovenia, Luxembourg, Cyprus, Latvia and Estonia) are among the countries with relatively higher indices for quality of port infrastructure in use among European countries.

Chart 15: Relationship between average amount of transportation FDI against average indices of Quality if port infrastructure (2006- 2014) for European countries.



Source: Author, 2016 based on FDI market data (2006 – 2014) and GCI data (2013-2014)

However, there are other countries like United Kingdom, Spain, Germany, France and Netherlands with relatively higher indices for quality of port infrastructure in use but are still highest receipients of transportation FDI; this is because such countries have other competitive advantages which despite the negative influence imposed by high quality of port infrastructure, they still attract inflows of transportation FDI due to other factors like high level of technological readiness and stable market size.

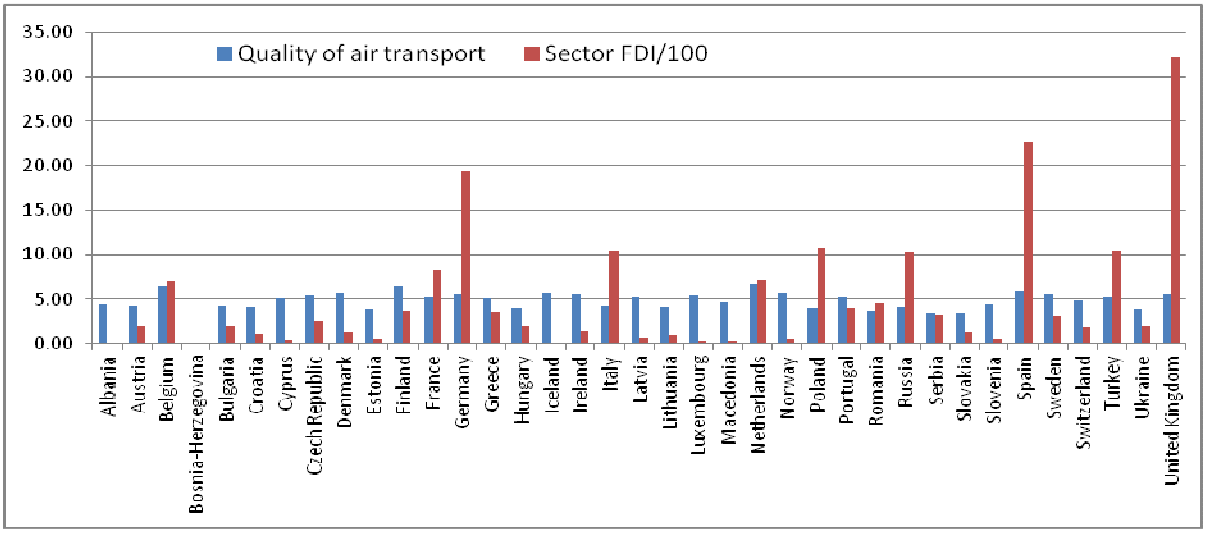
(d) Impact of quality of air transportation in European countries

Statistical significance of quality of air transportation in use in European countries is presented by Regresion model 4 (***ACTtraFDI 4***) in Table 12 above. It is seen that the

improvements in quality of air transportation in control of market size and technological readiness influences the inflow of FDI in transportation sector among European countries. The presentation reveals that improvements in quality of air transportation by 1 unit increases the inflow of FDI in transportation sector by 154.5 units when there is positive influence of market size catalyst and negative influence of technological readiness catalyst.

These findings are in comformity with what is observed when the averages of inflows of FDI in transportation sector and indices of the quality of road network for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 16 below). It is found that among the twelve European countries (i.e. Netherlands, Finland, Belgium, Spain, Iceland, Denmark, Norway, Germany, Sweden, United Kingdom, Ireland and Czech Republic) with highest average indices of quality of air transportation for duration of 2006-2014 (i.e. greater than 5.50); 50% of them (i.e. United Kingdom, Spain, Germany, France, Netherlands and Belgium) have been amongst the top most receipients of transportation FDI during 2006-2014 in Europe. Meanwhile, among the six European countries namely Bosnia-Herzegovina, Romania, Ukraine, Slovakia, Serbia and Estonia which have by average lowest indices of quality of air transportation (i.e. less than 4.0); two of them (i.e. Bosnia-Herzegovina and Estonia) have also been the least receipients of transportation FDI during 2006-2014 (i.e. received less than USD 1,250,000 in 9 years).

Chart 16: Relationship between average amount of transportation FDI against average indices of quality of air transportation (2006- 2014) for 37 European countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and GCI data (2013-2014)

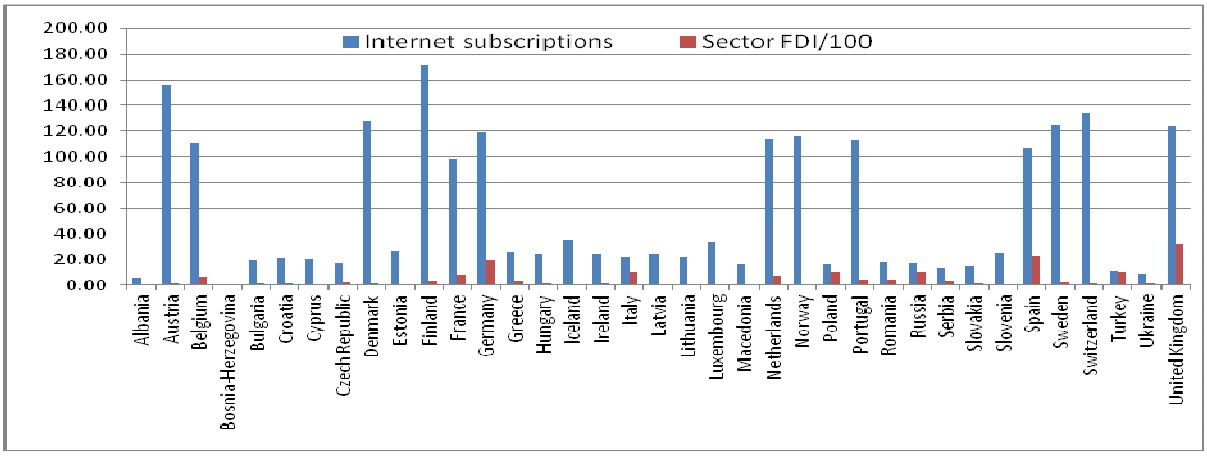
However, there are other countries like Iceland, Denmark, Norway and Ireland with relatively highe indices of quality of air transportation infrastructure but receive moderately low transportation FDI; this is because in such countries quality of air transportation alone in not sufficient to make them competitive for transportation FDI due to have other factors which make them competitive in attracting FDI, they require other factors like market size, macroeconomic condition and level of technology which are important in European countries to influence inflow of transportation FDI.

(e) Impact of reliable access to internet service (i.e. number of fixed internet brodband subscriptions per annum)

Statistical significance of number of fixed internet broadband subscriptions per annum in European countries is presented by Regresion model 6 (***ACTtraFDI 6***) in Table 12 above. It is seen that the increase in number of internet subscriptions per annum in control of market size, technological readiness and innovation influences the inflow of FDI in transportation sector among European countries. The presentation reveals that the raise of number of internet subscriptions per annum by 1 unit increases the inflow of transportation FDI by 4.15 units when there is positive influence of market size catalyst and negative contribution of technological readiness catalyst and innovation catalyst.

These findings are in comformity with what is observed when the averages of inflows of FDI in transportation sector and number of fixed internet subscriptions per annum for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 17 below).

Chart 17: Relationship between average amounts of transportation FDI against average number of internet subscriptions per annum (2006-2014) in 37 European countries



Source: Author, 2016 based on FDI market data (2006 – 2014) and GCI data (2013-2014)

It is found that among the twelve European countries (i.e. Finland, Austria, Switzerland, Denmark, Sweden, United Kingdom, Germany, Norway, Netherlands, Portugal, Belgium and Spain) with highest number of fixed internet subscriptions per annum for duration of 2006-2014 (i.e. greater than or equal to 100 million subscriptions per annum); six countries out of twelve which is equal to 50% (i.e. United Kingdom, Germany, Spain, Netherlands, Belgium and Portugal) have been amongst the top leading receipients of transportation FDI (i.e. received by average above USD 400 million per annum) during 2006-2014.

Meanwhile, among the thirteen European countries namely Bosnia-Herzegovina, Albania, Ukraine, Turkey, Slovakia, Serbia, Russia, Romania, Poland, Macedonia, Czech Republic, Cyprus and Bulgaria which had by average lowest number of fixed internet subscriptions during 2006-014 (i.e. less than 20 million subscriptions per annum in 9 years); seven countries out of thirteen which is equal to 54% (i.e. Bosnia-Herzegovina, Albania, Ukraine, Slovakia, Macedonia, Cyprus and Bulgaria) had been the least receipients of transportation FDI during 2006-2014 (i.e. received by average less than or equal to USD 200 million in 9 years).

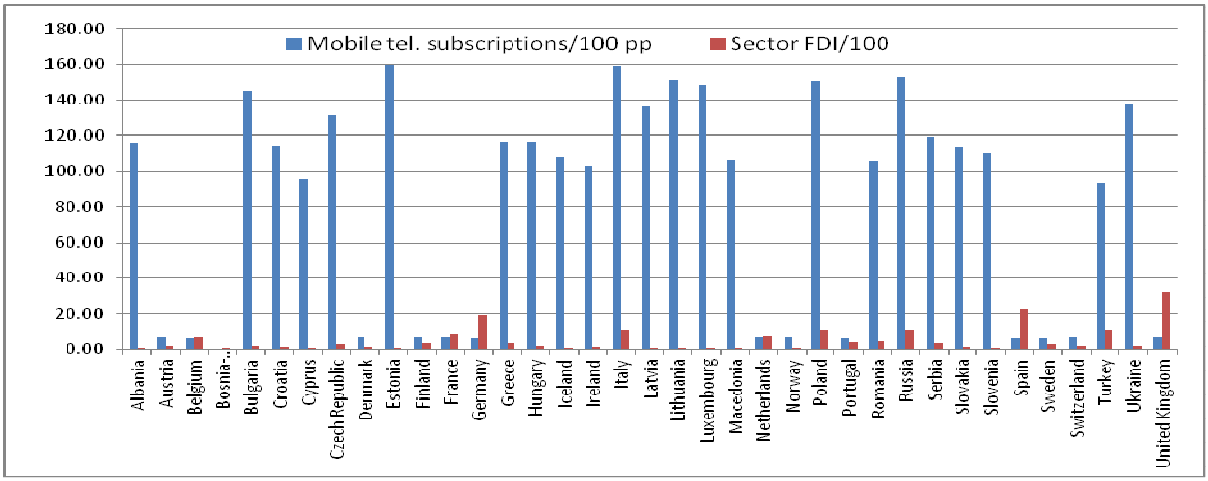
However, there are other countries like Austria, Switzerland, Denmark and Norway with highest numbers of fixed internet subscriptions but are among the least receipients of transportation FDI (i.e. received by average less than or equal to USD 200 million per annum during 2006-2014); this is because during received large shares of transportation FDI contrary to statistical findings; this is because in such countries there were other factors like market size, technological readiness and innovation which had negative influence to the inflow of transportation FDI during that duration and such factors were more influential than number of fixed internet subscriptions.

(f) Impact of reliable access to mobile telephone service (i.e. number of mobile tephone subscriptions per 100 people)

Statistical significance of number of mobile telephone subscriptions per 100 people per annum in European countries is presented by Regresion model 5 (***ACTtraFDI 5***) in Table 12 above. It is seen that the increase in number of mobile telephone subscriptions per 100 people per annum in control of market size, technological readiness and innovation influences negatively the inflow of FDI in transportation sector among European countries. The presentation reveals that the rise of number of mobile telephone subscriptions per 100 people per annum raises by 1 unit decreases the inflow of transportation FDI by 3.20 units when there is positive influence of market size catalyst and negative influence of technological readiness catalyst and innovation catalyst.

These findings are in comformity with what is observed when the averages of inflows of FDI in transportation sector and number of mobile subscriptions per 100 people per annum for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 18 below). It is found that among the five European countries (i.e. Estonia, Italy, Poland, Russia and Lithuania) with highest number of mobile telephone subscriptions per 100 people per annum for duration of 2006-2014 (i.e. greater than or equal to 150,000 subscriptions); 40% of them (i.e. Estonia and Lithuania) have been amongst the least receipients of transportation FDI (i.e. receiving by average less than USD 100,000 per annum) during 2006-2014.

Chart 18: Relationship between average amounts of transportation FDI against average number of mobile telephone subscription per 100 people per annum (2006-2014) in 37 European countries

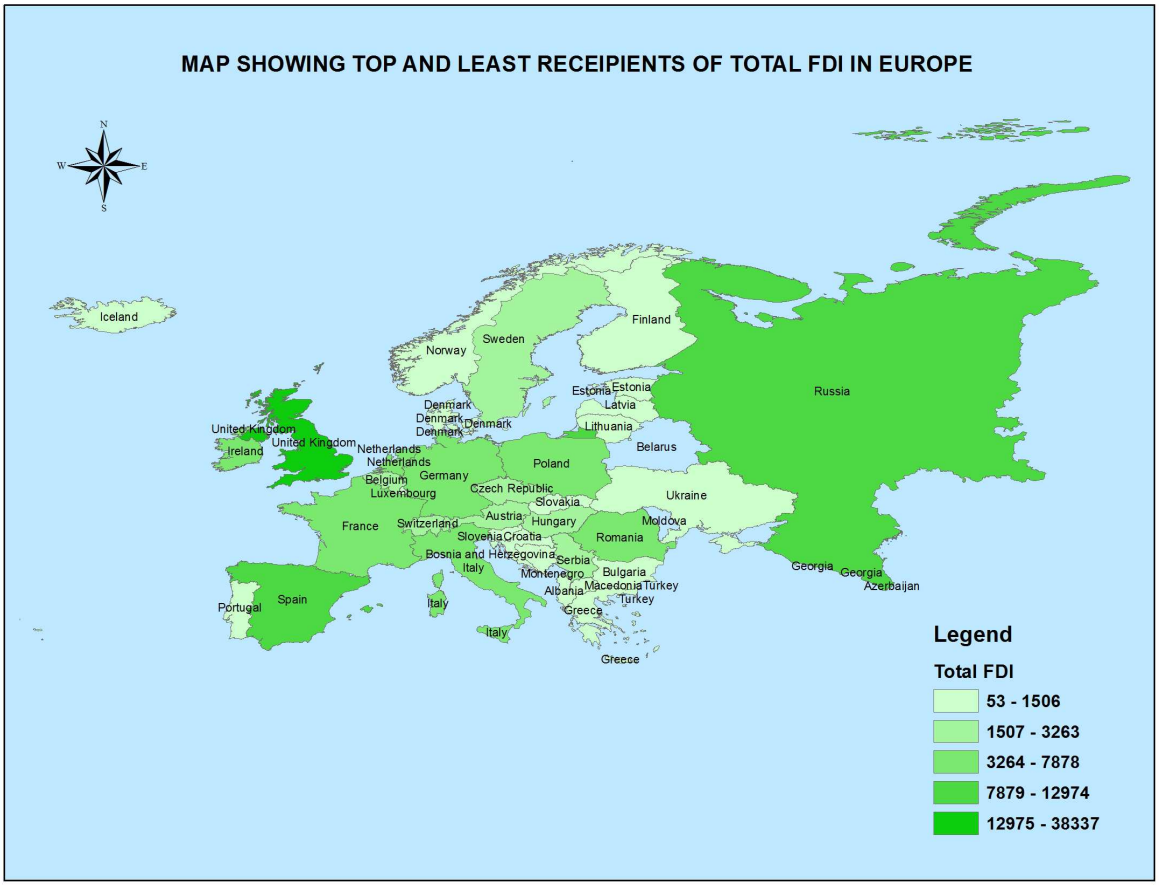


Source: Author, 2016 based on FDI market data (2006 – 2014) and GCI data (2013-2014)

Meanwhile, among the twelve European countries namely Bosnia-Herzegovina, Denmark, Finland, France, Germany, Netherlands, Norway, portugal, Spain, Sweden, Switzerland and United Kingdom which have by lowest number of mobile telephone subscriptions (i.e. less than 10,000 subscriptions per annum by average for duration of 2006-2014); three of them (i.e. United Kingdom, Germany and Spain) have been the top most receipients of transportation FDI during 2006-2014 (i.e. received by average above USD 1,900,000 in 9 years) in Europe.

However, there are other countries like Poland, Italy and Russia with highest numbers of mobile telephone subscriptions but received large shares of transportation FDI contrary to statistical findings; this is because in such countries there were other factors like market size, technological readiness and innovation which had higher influence to transportation FDI than number of mobile subscriptions as the result the reduction effect from large number of mobile subscriptions was minimized by market size catalyst such as high population and stable economy.

Map 2: Major FDI recipients' countries in Europe



Source: Author, 2016 based on FDI market data 2006-2014

(g) Impact of reliable electric supply (i.e. quality of electricity supply infrastructure)

Statistical significance of quality of electricity supply infrastructure in use in European countries is presented by Regresion model 5 (**ACTtraFDI 5**) in Table 12 above. It is seen that the improvements in quality of electricity supply infrastructure in control of market size, macroeconomic condition, labour market, technological readiness and innovation has no

statistical effect to the inflows of FDI in transportation sector among European countries. The presentation reveals that an improvement in quality of electricity supply infrastructure by 1 unit does influence the inflows of transportation FDI neither positively nor negatively when there is negative influence of labour market catalyst, technological readiness catalyst and innovation catalyst even if there is positive influence of macroeconomic environment catalyst and market size catalyst.

In Africa:

Basing on the analysis conducted in 32 countries, it is found that with exception of quality of electricity supply infrastructure; all other specific physical infrastructure namely quality of road networks, quality of railway, quality of port, quality of air transportation, number of mobile subscriptions and number of fixed internet subscriptions were significant in control of pillars of competitiveness (see Regression models 1, 2, 3, 4, 5, 6 and 7 in the table 13 below).

Table 13: Regression results of specific physical infrastructure and pillars of competitiveness against manufacturing FDI in 32 African countries for the period of 2006- 2014

VARIABLES	(1) ManuFDI	(2) ManuFDI	(3) ManuFDI	(4) ManuFDI	(5) ManuFDI	(6) ManuFDI	(7) ManuFDI
Efficiency and adequacy of Road networks							
Quality of roads index	123.3						
	(82.33)						
Efficiency and Length of Rail lines							
Quality of railway index		242.0**					
		(101.1)					
Efficiency of Port Services							
Quality of port index			170.5**				
			(82.60)				
Efficiency of Air Transportation Services							
Quality of air transportation index				172.8**			
				(67.89)			
Efficiency of Electricity Service							
Quality of electric supply index					213.9*		
					(125.0)		
Access to Mobile Telephone Services							
Number of mobile tel. subscriptions/ 100 people						0.741	
						(3.090)	
Access to Fixed Internet Broadband Services							
Number of fixed internet br. subscriptions							-0.000561
							(0.000603)
Quality of Institutions (Pillar 1)							
Business cost of crime and violence index	-57.64	0.647	-92.94	-99.35*	-102.4	14.25	-0.300
	(61.25)	(35.42)	(65.01)	(57.40)	(74.84)	(37.76)	(36.53)
Gross national savings index	-13.16	-15.44**	-13.10*	-12.29*	-17.30*	-10.28	-9.673
	(8.292)	(7.200)	(7.149)	(7.161)	(9.710)	(6.503)	(7.797)
Higher Education and Trainings (Pillar 5)							
Tertiary education enrollment index	6.860	7.350	7.778	8.584	2.111	5.687	12.62
	(10.97)	(10.23)	(10.38)	(10.86)	(10.51)	(11.62)	(14.34)
Avail. of research and training services index	109.0	164.6	-11.74	12.75	39.24	122.8	24.09
	(277.7)	(249.2)	(269.2)	(265.4)	(284.2)	(308.7)	(328.4)
Goods Market Efficiency (Pillar 6)							
Trade tariffs index	27.95	16.14	33.31	32.89	29.89	27.24	42.28
	(22.83)	(20.76)	(22.17)	(23.11)	(21.96)	(21.43)	(36.94)
Total tax rate index	-5.568	-4.415	-6.683	-5.031	-3.867	-7.285	-10.52
	(8.594)	(8.749)	(8.757)	(8.669)	(7.692)	(9.699)	(11.84)

Financial Market Efficiency (Pillar 8)							
Ease of access to loans index	-248.3	-226.3	-143.8	-217.1	-311.9	-219.6	-100.8
	(358.8)	(312.0)	(332.9)	(334.2)	(311.1)	(382.4)	(472.3)
Technological Readiness (Pillar 9)							
Availability of latest technology index	317.2	435.1	325.4	320.0	310.3	356.7	315.6
	(322.2)	(291.5)	(302.7)	(295.5)	(293.1)	(331.3)	(379.5)
Market Size (Pillar 10)							
Domestic market size index	1,488***	1,522***	1,511***	1,347***	1,457***	1,524***	1,789**
	(509.8)	(471.4)	(487.0)	(498.6)	(461.6)	(444.1)	(856.6)
Foreign market size index	-700.8**	-809.9**	-718.3**	-628.4*	-660.5**	-744.4***	-899.3
	(349.6)	(320.4)	(333.6)	(337.2)	(309.7)	(280.8)	(553.0)
Innovation (Pillar 12)							
Quality of scientific research institutions index	-914.8*	-1,172**	-938.8**	-862.6*	-779.0**	-906.0**	-970.5
	(475.0)	(486.3)	(440.3)	(442.9)	(381.7)	(422.0)	(619.1)
Business Sophistication (Pillar 11)							
Local supplier quality index	228.3	206.0	238.9	214.2	178.0	202.3	281.3
	(458.4)	(403.3)	(424.6)	(433.4)	(407.6)	(456.1)	(588.5)
Constant	-391.4	-124.5	-320.4	-311.7	-347.8	-426.9	-447.4
	(325.3)	(181.4)	(283.8)	(281.0)	(273.9)	(351.3)	(437.5)
Observations	279	279	279	279	279	279	279
R-Square	0.6929	0.7349	0.7234	0.7108	0.7285	0.6925	0.603
Number of Country_id2	32	32	32	32	32	32	32

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

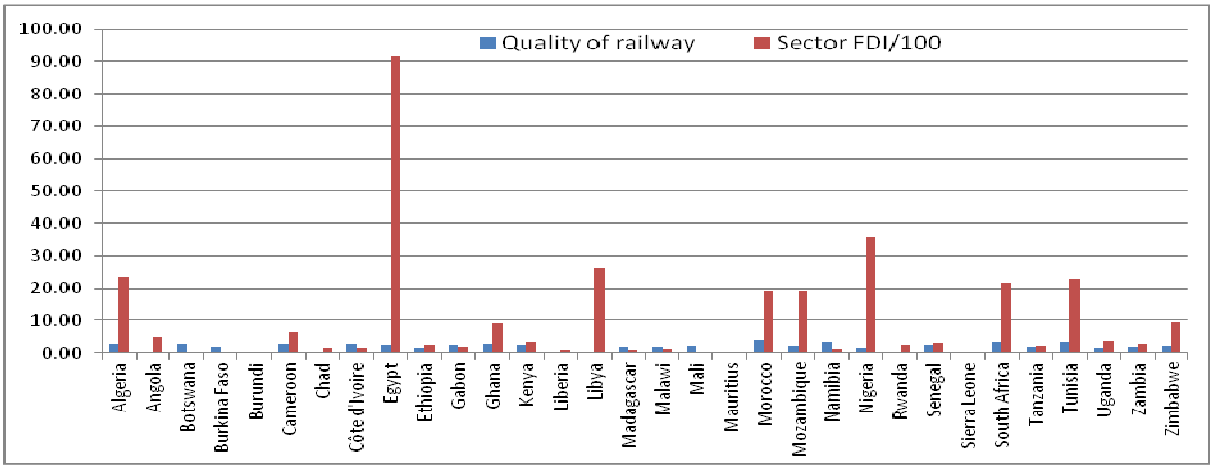
(a) Impact of quality of railway infrastructure in Africa

Statistical significance of quality of road networks in use in African countries is presented by Regresion model 2 ***(ManuFDI 2)*** in Table 13 above. It is seen that the improvements in quality of railway in control of macroeconomic condition, market size and innovation increases the inflows of FDI in manufacturing sector among African countries. The presentation reveals that improvements in quality of railway by 1 unit influences the inflow of FDI in manufacturing sector by 242.0 units when increase in domestic market size by 1 unit favor inflows of FDI in same sector by 94.94 units while decline in foreign market size, gross national savings and quality of scientific research institutions by 1 unit impede inflows of FDI in manufacturing sector by 809.9 units, 15.44 units and 1,172.0 units respectively.

These findings are in comformity with what is observed when the averages of inflows of FDI in manufacturing sector and indices for the quality of railway in use for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 19 below). It is found that among the first 10 African countries with relatively highest average FDI inflow in manufacturing sector (Egypt, Nigeria, Libya, Algeria, Tunisia, South Africa, Morocco, Mozambique, Zimbabwe and Ghana), 3 of them are among African countries with relatively highest indices for quality of railway in use (Morocco, Tunisia and South Africa). Meanwhile, among the last 10 African countries with relatively lowest average FDI inflow in manufacturing sector (Botswana, Burkina Faso, Burundi, Mali, Mauritius, Sierra Leone, Namibia, Liberia, Malawi and Madagascar); 6 of them are among the countries with relatively lowest indices for quality of railway (Liberia, Burundi, Mauritius, Sierra Leone, Malawi and Madagascar).

However, there are other countries like Libya, Nigeria and Angola with relatively lowest indices for quality of railway in use but receive moderately high FDI in manufacturing sector, this is because such countries have other factors like availability of natural resources and other type of infrastructure which make them competitive in attracting FDI in manufacturing sector despite poor quality of railway infrastructure in use.

Chart 19: Relationship between average amount of manufacturing FDI against average index value of quality of railway (2006- 2014) in 32 African countries



For other countries like Cameroon, Namibia, Botswana, Burkina Faso, Ghana and Kenya with moderate high index for quality of railway in use but receive relatively low FDI in manufacturing sector, it is because quality of railway in use alone in such countries is not sufficient to influence the inflow of FDI in manufacturing sector; there are other factors like political stability, market size, institutions and macroeconomic condition which are important in African countries to influence inflow of manufacturing FDI.

(b) Impact of quality of port infrastructure in Africa

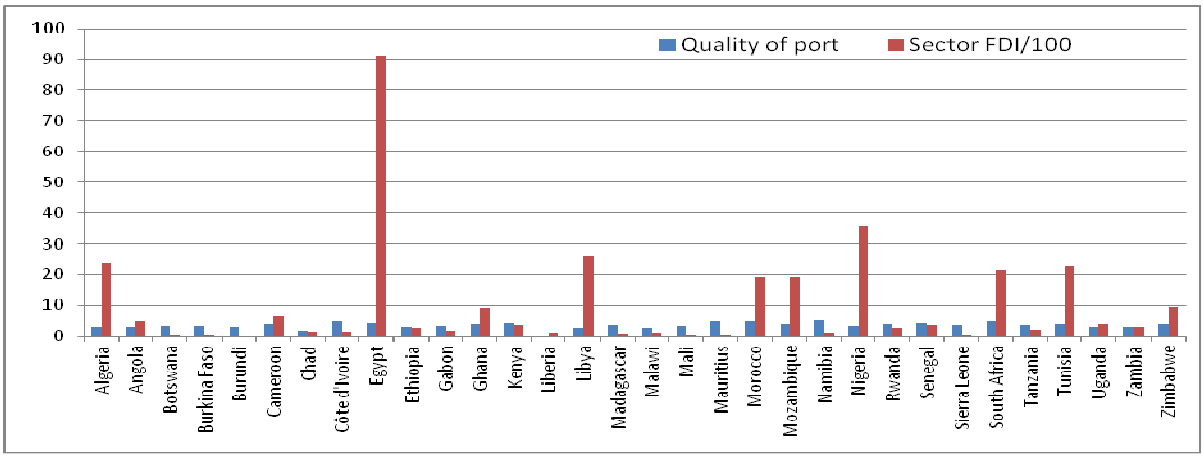
Statistical significance of quality of port infrastructure in use in African countries is presented by Regresion model 3 ***(ManuFDI 3)*** in Table 13 above. It is seen that the improvements in quality of port infrastructure in control of macroeconomic condition, market size and innovation increases the inflows of FDI in manufacturing sector among African countries. The presentation reveals that improvements in quality of port infrastructure by 1 unit influences the inflow of FDI in manufacturing sector by 170.5 units when increase in domestic market size by 1 unit favor inflows of FDI in same sector by 1,511.0 units while decline in foreign market size, gross national savings and quality of scientific research institutions by 1 unit impede inflows of FDI in manufacturing sector by 718.3 units, 13.10 units and 938.8 units respectively.

These findings are in comformity with what is observed when the averages of inflows of FDI in manufacturing sector and indices of quality of port infrastructure in use for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 20 below). It is found that among the first 10 African countries with relatively highest average FDI inflow in manufacturing sector (Egypt, Nigeria, Libya, Algeria, Tunisia, South Africa, Morocco, Mozambique, Zimbabwe and Ghana), 4 of them are among African countries with relatively highest indices of quality of port infrastructure in use (Morocco, Tunisia, Egypt and South Africa).

Meanwhile, among the 9 African countries namely Liberia, Chad, Malawi, Libya, Algeria, Angola, Burundi, Ethiopia and Zambia with relatively lowest average indices of quality of port infrastructure (i.e. less than 3.0); 4 of them (i.e. Burundi, Chad, Malawi, and Liberia) are among the African countries which have attracted least FDI in manufacturing sector for the duration of 2006-2014. Alternatively, among the 8 African countries namely Namibia, Cote

d'Ivoire, Mauritius, Morocco, South Africa, Senegal, Kenya and Egypt with relatively highest average indices of quality of port infrastructure (i.e. greater than 4.0); three of them which is equal to 37.5% (i.e. Morocco, South Africa and Egypt) are among the African countries which have attracted most FDI in manufacturing sector for the duration of 2006-2014.

Chart 20: Relationship between average amounts of manufacturing FDI against average indices of quality of port infrastructure (2006-2014) for 32 African countries



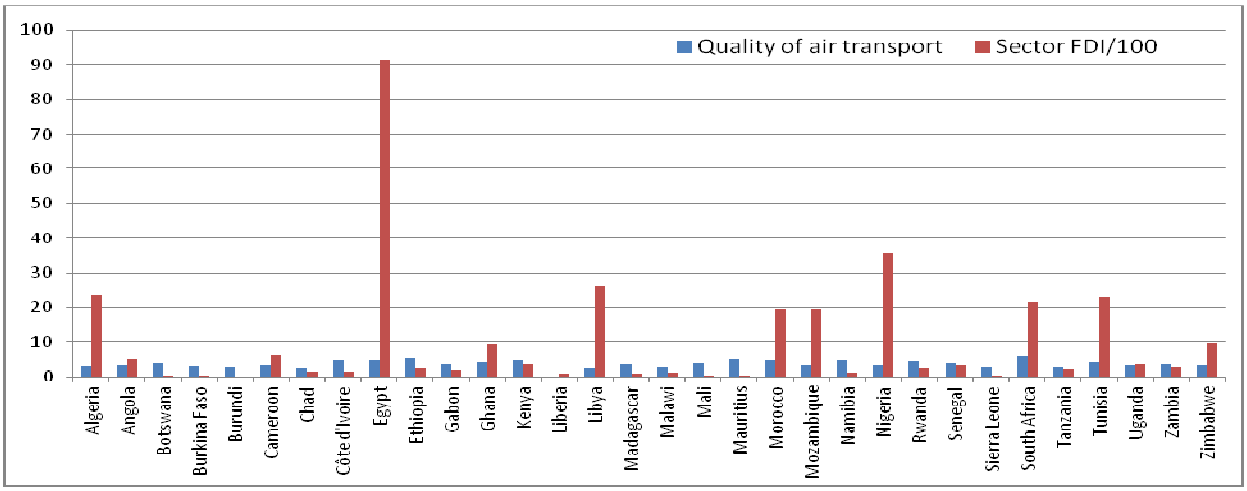
However, there are other countries like Libya and Algeria with relatively lowest indices of quality of port infrastructure in use (i.e. less than 3.0) but still are among the top receipient of manufacturing FDI (see Chart 20 above); this is because such countries are favored by other factors like availability of natural resources and other type of infrastructure which make them competitive in attracting FDI in manufacturing sector despite poor quality of railway infrastructure in use. For other countries like Namibia, Cote d'Ivoire and Mauritius which are among African countries with highest indices of quality of port infrastructure in use but but are among the least receipients of manufacturing FDI, it is because quality of port infrastructure in use alone in such countries is not sufficient to influence the inflow of FDI in manufacturing sector; there are other factors like small market size in Mauritius (1.3 million people) and Namibia (2.3 million people) and poor macroeconomic condition in Cote d'Ivoire due to political unrest in 2010-2011, lack of diversification in economic activities in Namibia due to climatic condition (more than 50% of country lies in Kalahari desert) and in Mauritius due to location factor (the country is an island).

(c) Impact of quality of air transportation infrastructure in Africa

Statistical significance of quality of air transportation infrastructure in use in African countries is presented by Regresion model 4 ***(ManuFDI 4)*** in Table 13 above. It is seen that the improvements in quality of air transportation infrastructure in control of quality of institutions, macroeconomic condition, market size and innovation increases the inflows of FDI in manufacturing sector among African countries. The presentation reveals that improvements in quality of air transportation infrastructure by 1 unit influences the inflow of FDI in manufacturing sector by 172.8 units when increase in domestic market size by 1 unit favor inflows of FDI in same sector by 1,347.0 units while fall of business cost of crime and violence, foreign market size, gross national savings and quality of scientific research institutions by 1 unit impede inflows of FDI in manufacturing sector by 99.15 units, 628.4 units, 12.29 units and 862.6 units respectively.

These findings are in comformity with what is observed when the averages of inflows of FDI in manufacturing sector and indices of quality of air transportation infrastructure in use for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 21 below). It is found that among the eleven African countries (i.e. South Africa, Ethiopia, Cote d'Ivoire, Egypt, Kenya, Ghana, Mauritius, Morocco, Namibia, Rwanda and Tunisia) with highest average indices of quality of air transportation for duration of 2006-2014 (i.e. greater than 4.0); 36.4% of them (i.e. South Africa, Tunisia, Egypt and Morocco) have been amongst the top most receipients of manufacturing FDI (i.e. received by average above USD 1,900,000 per annum in 9 years) during 2006-2014 in Africa.

Chart 21: Relationship between average amount of transportation FDI against average Indices of quality of air transportation (2006- 2014) for 37 African countries



Meanwhile, among the eigth African countries namely Sierra Leone, Liberia, Algeria, Malawi, Libya, Tanzania, Chad and Burundi which have by average lowest indices of quality of air transportation (i.e. less than 3.0); five countries out of eigth which is equal to 63.5% (i.e. Sierra Leone, Liberia, Burundi, Chad and Tanzania) have also been the least receipients of manufacturing FDI during 2006-2014 (i.e. received by average less than USD 250,000 per annum in 9 years).

However, there are other countries like Ethiopia, Cote d'Ivoire, Mauritius, Namibia, Rwanda and Kenya with relatively higher indices of quality of air transportation infrastructure but receive moderately low transportation FDI as compared to other African countries; this is because in such countries quality of air transportation alone in not sufficient to make them competitive for manufacturing FDI; they requre other factors like quality of institutions, market size, macroeconomic condition and level of technology which are important for conducive business environments African countries which consequently influence inflow of manufacturing FDI.

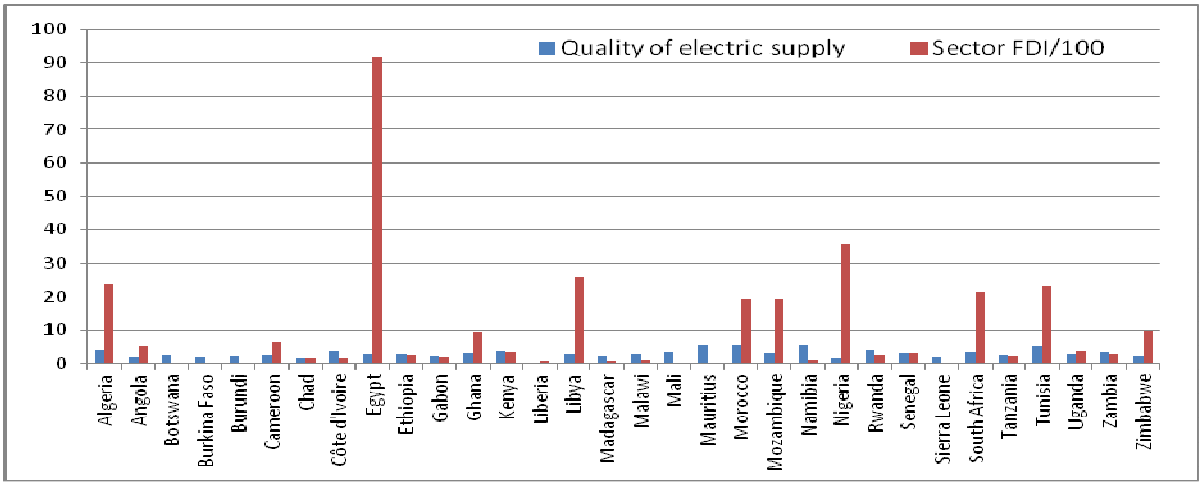
(d) Impact of reliable electric supply (i.e. quality of electricity supply infrastructure) in Africa

Statistical significance of quality of electricity supply infrastructure in use in African countries is presented by Regresion model 5 ***(ManuFDI 5)*** in Table 13 above. It is seen that the improvements in quality of electricity supply infrastructure in control of market size, microeconomic condition and innovation increases the inflows of FDI in manufacturing sector among African countries. The presentation reveals that improvements in quality of

electricity supply infrastructure by 1 unit influences the inflow of FDI in manufacturing sector by 213.9 units when increase in domestic market size by 1 unit favor inflows of FDI in same sector by 1,457.0 units while fall of gross national savings, foreign market size and quality of scientific research institutions by 1 unit reduce inflows of manufacturing FDI by 17.30 units, 660.5 units and 779.0 units respectively.

These findings are in comformity with what is observed when the averages of inflows of FDI in manufacturing sector andt indices of average quality of electricity supply infrastructure in use for the same duration 2006-2014 (9 years) are plotted in histograms (see Chart 22 below).

Chart 22: Relationship between average amounts of manufacturing FDI against indices of average quality of electricity supply (2006-2014) for 32 African countries



It is found that among the first top ten African countries with highest quality of electricity supply infrastructure (i.e. Tunisa, Namibia, South Africa, Mauritius, Rwanda, Algeria, Kenya, Cote d'Ivoire, South Africa, Morocco and Mali) for duration of 2006-2014 (i.e. greater than 3.5); four countries out of ten which is equal to 40% (i.e. Tunisia, South Africa, Algeria and Morocco) have been amongst the top most receipients of manufacturing FDI (i.e. received by average above USD 1,900,000 per annum in 9 years) during 2006-2014 in Africa.

Meanwhile, among the thirteen African countries namely Liberia, Angola, Burkina Faso, Chad, Nigeria, Sierra Leone, Botswana, Burundi, Cameroon, Gabon, Madagascar, Tanzania and Zimbabwe which have by average lowest indices of quality of electricity supply infrastructure (i.e. less than 2.5); eight countries out of thirteen which is equal to 61.5% (i.e. Liberia, Sierra Leone, Burkina Faso, Chad, Botswana, Burundi, Gabon and Madagascar) have also been the least receipients of manufacturing FDI during 2006-2014 (i.e. received by average less than USD 200 million per annum in 9 years).

However, there are other countries like Namibia, Mauritius, Cote d'Ivoire and Mali with highest indices of quality of electricity supply infrastructure (i.e. greater than 3.5) but were among the least receipients of manufacturing FDI during the period of 2006-2014 (i.e. received by average less than USD 200 million per annum in 9 years). This is because in such countries quality of electricity supply infrastructure alone in not sufficient to make them competitive for manufacturing FDI; they requre other factors like quality of institutions, market size, macroeconomic condition and level of technology which are important for conducive business environments African countries which consequently influence inflow of

manufacturing FDI. Moreover, there are no African countries which were among the top receipients of manufacturing FDI during 2006-2014 (i.e. received by average above USD 1,900 million in 9 years) and are categorised as having lowest indices of quality of electricity infrastructure (i.e. less than 2.5) in same period. This shows that quality of electricity supply infrastructure is crucial in attracting manufacturing FDI especially during the period of 2006-2014.

(e) Impact of quality of road networks in Africa

Statistical significance of quality of road networks in use in African countries is presented by Regresion model 1 ***(ManuFDI 1)*** in Table 13 above. It is seen that the improvements in qquality of road network in control of market size and innovation level has no statistical effect to the inflows of FDI in manufacturing sector among African countries. The presentation reveals that improvements in road network does neither influence nor impedes the inflows of FDI in manufacturing sector when there is positive influence of domestic market size and negative influence of foreign market size and quality of scientific research institutions.

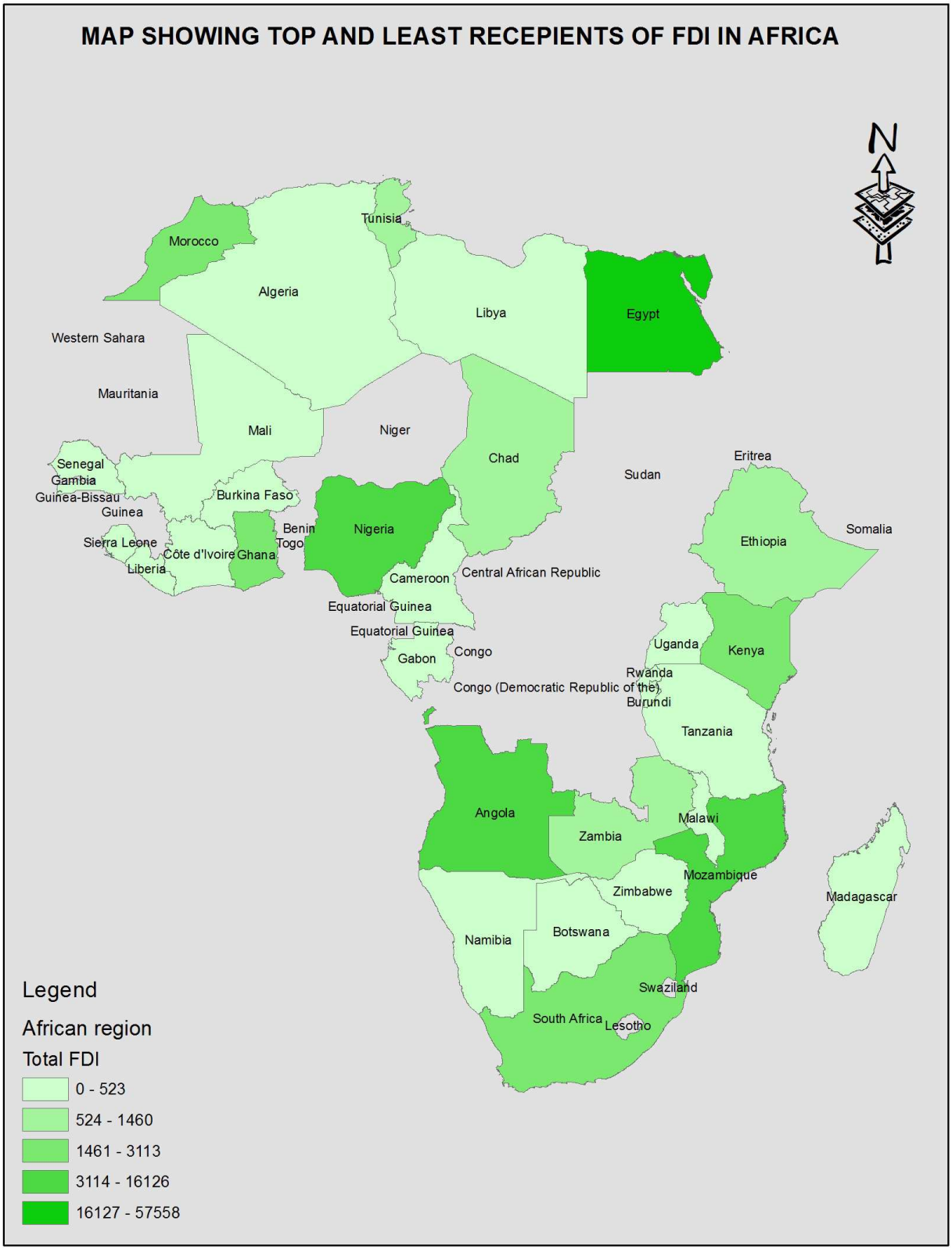
(f) Impact of reliable access to mobile telephone service (i.e. number of mobile tephone subscriptions per 100 people) in Africa

Statistical significance of number of mobile telephone subscriptions per 100 people per annum in African countries is presented by Regresion model 6 (***ManuFDI 6***) in Table 13 above. It is seen that the increase in number of mobile telephone subscriptions per 100 people per annum in control of market size, technological readiness and innovation does neither influence nor impede the inflow of FDI in manufacturing sector among African countries. The presentation reveals that the rise of number of mobile telephone subscriptions per 100 people per annum by 1 unit has no statistical effect to the inflow of manufacturing FDI when there is positive influence of domestic market size and negative influence of foreign market size and quality of scientific research institutions.

(g) Impact of reliable access to internet service (i.e. number of fixed internet brodband subscriptions per annum) in Africa

Statistical significance of number of fixed internet broadband subscriptions per annum in African countries is presented by Regresion model 7 (***ACTtraFDI 7***) in Table 13 above. It is seen that the increase in number of fixed internet subscriptions per annum in control of domestic market size does not influence the inflow of FDI in manufacturing sector among African countries. The presentation reveals that the rise of number of fixed internet subscriptions per annum by 1 unit has no statistical effect to the inflow of manufacturing FDI when there positive influence of market size catalyst.

Map 3: Major FDI recipients'' countries in Africa (2006-2014)



Source: Author, 2016 based on FDI market data 2006-2014

In East Africa:

Basing on the analysis conducted in 37 countries, it is found that with exception of quality of electricity supply infrastructure; all other specific physical infrastructure namely quality of road networks, quality of railway, quality of port, quality of air transportation, number of mobile subscriptions and number of fixed internet subscriptions were significant in control of pillars of competitiveness (see Regression models 1, 2, 3, 4, 5, 6 and 7 in the table 14 below).

(a) Impact of quality of road network in East Africa

Statistical significance of quality of road network in use in East African countries is presented by Regresion models 1 (Manufacturing FDI), 2 (Service FDI), 3 (Extraction FDI) and 4 (Total FDI) in Table 14 below. It is seen that the improvements in quality of road network in control of macroeconomic condition, higher education and trainings and market efficiency increases the inflows of FDI in manufacturing and service sectors in East Africa.

For the inflow of manufacturing FDI, the presentations reveal that improvements in quality of road network by 1 unit influences the inflow of FDI in manufacturing sector by 79.35 units when there is positive influence of gross national savings, inflation, tertiary education enrolment and availability of research and trainings services even if there is negative influence of total tax rate (see Regression model 1 in Table 14 below).

Table 14: Regression results of quality of road networks (i.e. specific infrastructure and pillars of competitiveness against inflows of total and sector FDI in 5 East African countries for the period of 2006-2014.

VARIABLES	(1) ManuFDI	(2) Service FDI	(3) Extraction FDI	(4) Total FDI
Efficiency and extensiveness of road network				
Quality of roads index	79.35***	397.8*	38.11	593.7
	(25.75)	(233.2)	(207.6)	(537.9)
Quality of Institutions (Pillar 1)				
Strength of investor protection index		-563.9	-49.30	-2,792***
		(351.7)	(313.2)	(811.3)
Business cost of crime and violence index		297.7	31.95	2,587***
		(194.0)	(172.8)	(447.5)
Macroeconomic condition (Pillar 3)				
Gross national savings index	8.283***	99.84**	42.50	476.6***
	(0.235)	(50.47)	(44.94)	(116.4)
Inflation index	1.063**	20.40**	34.12***	214.5***
	(0.529)	(8.501)	(7.569)	(19.61)
Higher Education and Trainings (Pillar 5)				
Tertiary education enrollment index	0.672***	-185.3***	70.63	-749.7***
	(0.00644)	(65.19)	(58.04)	(150.3)
Avail. of research and training service index	93.74***	1,380**	123.9	6,735***
	(11.99)	(662.0)	(589.4)	(1,527)
Market efficiency (Pillar 6)				
Total tax rate6	-10.69***	-123.9*	-31.06	-650.3***
	(0.730)	(66.49)	(59.20)	(153.4)
o._cons	0	0	0	0
	(0)	(0)	(0)	(0)
Observations	45	45	45	45
R-Squared	1	1	1	1
Number of country_id2	5	5	5	5

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For the inflow of service FDI, it is revealed that improvements in quality of road network by 1 unit influences the inflow of FDI in service sector by 397.8 units when there is positive influence of gross national savings, inflation and availability of research and trainings services and negative influence of tertiary education enrolments and total tax rate (see Regression model 2 in Table 14 below).

It is also revealed that, the same improvements in quality of roads network has no statistical effects to the inflows of extraction FDI and total FDI (see Regression models 3 and 4 in table 12).

(b) Impact of quality of railway infrastructure in East Africa

Statistical significance of quality of railway in use in East African countries is presented by Regresion models 1 (Manufacturing FDI), 2 (Service FDI), 3 (Extraction FDI) and 4 (Total FDI) in Table 15 below. It is seen that the improvements in quality of railway in control of quality of institutions, macroeconomic condition, higher education and trainings and market efficiency increases the inflows of manufacturing FDI, service FDI and extraction FDI and consequently total inflows of foreign investments in East Africa.

For the inflow of manufacturing FDI, the presentation reveals that improvements in quality of railway by 1 unit influences the inflow of FDI in manufacturing sector by 4,669 units when there is positive influence of business cost of crime and violence, inflation and tertiary education enrolment and negative influence of gross national savings, total tax rate and strength of investors' protection (see Regression model 1 in Table 15 below).

Table 15: Regression results of quality of railway (i.e. specific physical infrastructure) and pillars of competitiveness against inflows of total and sector FDI in 5 East African countries for the period of 2006- 2014

VARIABLES	(1) Manu FDI	(2) Service FDI	(3) Extraction FDI	(4) Total FDI
Efficiency of Railway infrastructure				
Quality of railway	4,669***	244.6***	15.31***	4,928***
	(1.30e-09)	(1.18e-10)	(4.16e-10)	(7.53e-09)
Quality of Institutions (Pillar 1)				
Strength of investor protection index	-1,941***	36.16***	8.179***	-1,897***
	(5.59e-10)	(5.06e-11)	(1.79e-10)	(3.24e-09)
Business cost of crime and violence index	2,126***	-33.36***	0.241***	2,093***
	(6.03e-10)	(5.35e-11)	(1.90e-10)	(3.43e-09)
Macroeconomic condition (Pillar 3)				
Gross national savings index	-284.6***	-16.91***	32.33***	-269.2***
	(7.96e-11)	(0)	(0)	(4.58e-10)
Inflation index	278.9***	12.43***	33.14***	324.5***
	(7.81e-11)	(0)	(0)	(4.45e-10)
Higher Education and Trainings (Pillar 5)				
Tertiary education enrollment index	916.2***	4.852***	86.22***	1,007***
	(2.53e-10)	(0)	(8.12e-11)	(1.47e-09)
Market Efficiency (Pillar 6)				
Total tax rate index	-220.4***	1.539***	-19.44***	-238.3***
	(6.20e-11)	(0)	(0)	(3.54e-10)
o._cons	0	0	0	0
	(0)	(0)	(0)	(0)
Observations	45	45	45	45
R-Squared	1	1	1	1
Number of country_id2	5	5	5	5

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For the inflow of service FDI, it is revealed that improvements in quality of railway by 1 unit influences the inflow of FDI in service sector by 244.6 units when there is positive influence of strength of investors' protection, inflation, tertiary education enrolment and total tax rate and negative influence of gross national savings and business cost of crime and violence (see Regression model 2 in Table 15 above).

For the inflow of extraction FDI, it is revealed that improvements in quality of railway by 1 unit influences the inflow of FDI in extraction sector by 15.31 units when there is positive influence of strength of investors' protection, tertiary education enrolment, gross national savings, inflation and business cost of crime and violence and negative influence of total tax rate (see Regression model 3 in Table 15 above).

As the result, it is shown that improvements in quality of railway infrastructure by 1 unit influences the inflow of total FDI by 4,928 when there is positive contribution of tertiary education enrolment, inflation and business cost of crime and violence and negative contribution of strength of investors' protection, gross national savings and total tax rate (see Regression model 4 in Table 15 above).

(c) Impact of quality of port infrastructure in East Africa

Statistical significance of quality of port infrastructure in use in East African countries is presented by Regresion models 1 (Manufacturing FDI), 2 (Service FDI), 3 (Extraction FDI) and 4 (Total FDI) in Table 14. It is seen that the improvements in quality of port infrastructure in control of quality of institutions, macroeconomic condition, higher education and trainings and market efficiency increases the inflows of manufacturing FDI, service FDI and extraction FDI and consequently total inflows of foreign investments in East Africa.

For the inflow of manufacturing FDI, the presentation reveals that improvements in quality of port infrastructure by 1 unit influences the inflow of FDI in manufacturing sector by 88.86 units when there is positive influence of gross national savings, tertiary education enrolments and availability of research and training services even if there are negative contribution from inflation and total tax rate (see Regression model 1 in Table 16 below).

For the inflow of service FDI, it is revealed that improvements in quality of port infrastructure by 1 unit does not influences the inflow of FDI in service sector when there is positive contribution of inflation and negative contribution of tertiary education enrolments (see Regression model 2 in Table 16 below).

For the inflow of extraction FDI, it is revealed that improvements in quality of port infrastructure by 1 unit influences the inflow of FDI in extraction sector by 472.9 units when there is positive contribution of business cost of crime and violence, gross national savings, inflation and availability of research and training services even if there are negative contribution from strength of investors' protection and total tax rate (see Regression model 3 in Table 16 below).

As the result, it is shown that improvements in quality of port infrastructure by 1 unit influences the inflow of total FDI by 848.9 units when there is positive contribution of business cost of crime and violence, gross national savings, inflation and availability of research and trainings even if there are negative contribution from strength of investors' protection and total tax rate (see Regression model 4 in Table 16 below).

Table 16: Regression results of quality of port (i.e. specific physical infrastructure) and pillars of competitiveness against inflows of total and sector FDI in 5 East African countries for the period of 2006- 2014

VARIABLES	(1) Manu FDI	(2) Service FDI	(3) Extraction FDI	(4) Total FDI
Efficiency of Port Infrastructure				
Quality of port index	88.86***	269.9	472.9**	848.9**
	(20.04)	(273.1)	(190.5)	(391.8)
Quality of Institutions (Pillar 1)				
Strength of investor protection index		-335.0	-642.2**	-3,064***
		(375.6)	(262.0)	(538.8)
Business cost of crime and violence index		210.9	428.3**	2,861***
		(247.2)	(172.4)	(354.7)
Macroeconomic condition (Pillar 3)				
Gross national savings index	3.905***	53.77	104.4***	474.1***
	(1.150)	(40.52)	(28.26)	(58.13)
Inflation index	-4.081***	4.181**	29.72***	187.5***
	(0.792)	(1.740)	(1.214)	(2.497)
Higher Education and Trainings (Pillar 5)				
Tertiary education enrolments index	4.616***	-139.6**	-33.47	-789.7***
	(0.894)	(66.27)	(46.22)	(95.07)
Avail. of research and training services index	86.22***	943.6	1,230**	7,229***
	(10.03)	(701.3)	(489.2)	(1,006)
Market Efficiency (Pillar 6)				
Total tax rate index	-9.383***	-80.74	-143.3***	-701.9***
	(0.214)	(71.08)	(49.58)	(102.0)
o._cons	0	0	0	0
	(0)	(0)	(0)	(0)
Observations	45	45	45	45
R-Squared	1	1	1	1
Number of country_id2	5	5	5	5

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(d) Impact of quality of air transportation infrastructure in East Africa

Statistical significance of quality of air transportation infrastructure in use in East African countries is presented by Regresion models 1 (Manufacturing FDI), 2 (Service FDI), 3 (Extraction FDI) and 4 (Total FDI) in Table 17. It is seen that the improvements in quality of air transportation infrastructure in control of quality of institutions, macroeconomic condition, higher education and trainings and market efficiency have influence to the inflows of manufacturing FDI and service FDI; and no influence to extraction FDI and total FDI in East Africa.

For the inflow of manufacturing FDI, the presentation reveals that improvements in quality of air transportation infrastructure by 1 unit influences the inflow of FDI in manufacturing sector by 89.20 units when there is positive influence of gross national savings, tertiary education enrolment and availability of research and training services even if there are negative contribution from inflation and total tax rate (see Regression model 1 in Table 17 below).

For the inflow of service FDI, it is revealed that improvements in quality of air transportation infrastructure by 1 unit reduces the inflow of FDI in service sector by 78.11 units when there is positive influence of general government debt and negative contribution of tertiary education enrolment (see Regression model 1 in Table 17 below).

Table 17: Regression results of quality of Air transportation (i.e. specific physical infrastructure) and pillars of competitiveness against inflows of total and sector FDI in East African countries for the period of 2006-2014

VARIABLES	(1) Manu FDI	(2) Service FDI	(3) Extraction FDI	(4) Total FDI
Efficiency of Air transportation infrastructure				
Quality of air transportation index	89.20***	-78.11**	899.7	1,049
	(18.34)	(36.14)	(877.0)	(1,077)
Quality of Institutions (Pillar 1)				
Strength of investor protection index		-316.3	-1,333	-4,187***
		(449.1)	(1,100)	(1,494)
Business cost of crime and violence index		171.2	555.3	3,132***
		(240.3)	(441.9)	(656.1)
Macroeconomic condition (Pillar 3)				
Gross national savings index	4.740***	52.49	160.8*	602.2***
	(0.877)	(45.72)	(96.70)	(136.7)
General government debt index		2.128***	-4.943	15.83
		(0.566)	(9.412)	(11.68)
Inflation index	-6.501***			
	(1.220)			
Health and Primary Education (Pillar 4)				
Health catalyst index		24.43	26.93	72.90
		(25.16)	(23.41)	(52.12)
Higher Education and Trainings (Pillar 5)				
Tertiary education enrollment index	12.10***	-151.8**	29.00	-877.5***
	(2.355)	(70.75)	(60.74)	(149.1)
Avail. of research and training services index	44.09**	1,086	1,692	9,305***
	(17.81)	(881.3)	(1,172)	(2,035)
Market Efficiency (Pillar 6)				
Total tax rate index	-7.347***	-95.39	-215.8	-938.4***
	(0.224)	(92.30)	(140.6)	(226.9)
o._cons	0	0	0	0
	(0)	(0)	(0)	(0)
Observations	45	45	45	45
	1	1	1	1
Number of country_id2	5	5	5	5

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For the inflow of extraction FDI, it is revealed that improvements in quality of air transportation infrastructure by 1 unit have no statistical effects to the inflow of extraction FDI when there is positive influence of gross national savings (see Regression model 3 in Table 17 above).

As the result, it is shown that improvements in quality of air transportation infrastructure by 1 unit does not influences the inflow of total FDI when there are negative contribution from strength of investors' protection and total tax rate even if there are positive contribution of business cost of crime and violence, gross national savings and availability of research and trainings (see Regression model 4 in Table 17 above).

(e) Impact of efficiency electricity supply (i.e. quality of electricity upply infrastructure) in East African countries

Statistical significance of quality of electricity supply in use in East African countries is presented by Regresion models 1 (Manufacturing FDI), 2 (Service FDI), 3 (Extraction FDI)

and 4 (Total FDI) in Table 16. It is seen that the improvements in quality of electricity supply in control of quality of institutions, macroeconomic condition, higher education and trainings and market efficiency increases the inflows of manufacturing FDI, extraction FDI and consequently total inflows; however has no statistical effect to the inflows of service FDI in East Africa.

For the inflow of manufacturing FDI, the presentation reveals that improvements in quality of electricity supply by 1 unit influences the inflow of FDI in manufacturing sector by 109.4 units when there is positive contribution of gross national savings, tertiary education enrolment and availability of research and training services even if there are negative contribution from inflation and total tax rate (see Regression model 1 in Table 18 below).

For the inflow of extraction FDI, it is revealed that improvements in quality of electricity supply by 1 unit influences the inflow of FDI in service sector by 839.4 units when there is high strength of investors' protection, tertiary education enrolment, total tax rate; while there is low gross national savings and business cost of crime and violence (see Regression model 1 in Table 18 below).

Table 18: Regression results of quality of Electricity supply (i.e. specific physical infrastructure) and pillars of competitiveness against inflows of total and sector FDI in 5 East African countries for the period of 2006- 2014

VARIABLES	(1) Manu FDI	(4) Service FDI	(3) Extraction FDI	(5) Total FDI
Efficiency of Electricity supply infrastructure				
Quality of electric supply index	109.4***	192.2	839.4*	1,291**
	(26.73)	(208.0)	(463.6)	(618.1)
Quality of Institutions (Pillar 1)				
Strength of investor protection index		-58.16	-403.8*	-2,530***
		(102.1)	(227.5)	(303.4)
Business cost of crime and violence index		-64.32*	-135.0*	1,885***
		(33.52)	(74.70)	(99.61)
Macroeconomic condition (Pillar 3)				
Gross national savings index	9.527***	28.68*	99.54***	448.6***
	(0.127)	(16.18)	(36.06)	(48.08)
Inflation index	-4.612***	-10.78	-40.12	80.83
	(0.988)	(18.05)	(40.23)	(53.65)
Higher Education and Trainings (Pillar 5)				
Tertiary education enrollment index	6.674***	-62.83***	130.6***	-507.9***
	(1.471)	(12.22)	(27.24)	(36.32)
Avail. of research and training service index	48.66**	281.7***	151.4**	5,258***
	(20.05)	(33.62)	(74.92)	(99.90)
Market Efficiency (Pillar 6)				
Total tax rate index	-8.051***	-17.12**	-49.09***	-525.5***
	(0.0937)	(7.160)	(15.96)	(21.27)
o._cons	0	0	0	0
	(0)	(0)	(0)	(0)
Observations	45	45	45	45
R-Squared	1	1	1	1
Number of country_id2	5	5	5	5

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For the inflow of service FDI, it is revealed that improvements in quality of electricity supply by 1 unit does not have statistical effect to the inflow of service FDI even in the positive

contribution of gross national savings and availability of research and training services and negative contribution of business cost of crime and violence, tertiary education enrolment and total tax rate (see Regression model 2 in Table 18 above).

As the result, it is shown that improvements in quality of electricity supply infrastructure by 1 unit influences the inflow of total FDI by 1,291 units when there is positive contribution of business cost of crime and violence, gross national saving, and availability of research and training service even if there are negative contribution from strength of investors' protection, tertiary education enrolments and total tax rate (see Regression model 4 in Table 18 above).

(f) Impact of access to mobile telephone service (i.e. number of mobile telephone subscriptions per 100 people per annum) in East African countries

Statistical significance of access to mobile telephone service in East African countries is presented by Regresion models 1 (Manufacturing FDI), 2 (Extraction FDI), 3 (Service FDI) and 4 (Total FDI) in Table 19 below. It is seen that the increase in number of mobile telephone subscriptions in control of quality of institutions, macroeconomic condition, higher education and trainings and market efficiency increases the inflows of manufacturing FDI, extraction FDI and consequently total inflows; however has no statistical effect to the inflows of service FDI in East Africa.

For the inflow of manufacturing FDI, the presentation reveals that increase in number of mobile telephone subscriptions by 1 unit influences the inflow of FDI in manufacturing sector by 5.531 units when there is positive contribution of business cost of crime and violence, gross national savings, inflation and availability of research and training services even if there are negative contribution from strength of investors' protection, tertiary education enrolment and total tax rate (see Regression model 1 in Table 19 below).

For the inflow of extraction FDI, it is revealed that increase in number of mobile telephone subscriptions by 1 unit influences the inflow of FDI in extraction sector by 6.732 units when there when there is positive contribution of business cost of crime and violence, gross national savings, inflation, tertiary education enrolments and availability of research and training services even if there are negative contribution from strength of investors' protection and total tax rate (see Regression model 2 in Table 19 below).

For the inflow of service FDI, it is revealed that increase in number of mobile telephone subscriptions by 1 unit does not have statistical effect to the inflow of service FDI even in the positive contribution of gross national savings, inflation and availability of research and training services and negative contribution of tertiary education enrolments and total tax rate (see Regression model 3 in Table 19 below).

As the result, it is shown that increase in number of mobile telephone subscriptions by 1 unit influences the inflow of total FDI by 22.53 units when there is positive contribution of business cost of crime and violence, gross national saving, inflation and availability of research and training service even if there are negative contribution from strength of investors' protection and tertiary education enrolments (see Regression model 4 in Table 19 below).

Table 19: Regression results of number of mobile subscriptions (i.e. specific physical infrastructure) and pillars of competitiveness against inflows of total and sector FDI in 5 East African Countries for the period of 2006- 2014)

VARIABLES	(2) Manu FDI	(3) Extraction FDI	(4) Service FDI	(1) Total FDI
Access to mobile telephone				
Number of mobile telephone subscriptions/100 pp	5.531**	6.732**	10.33	22.59**
	(2.347)	(2.981)	(6.530)	(9.719)
Quality of Institutions (Pillar 1)				
Strength of investor protection index	-2,140***	-233.8**	-334.9	-2,709***
	(84.34)	(107.1)	(234.7)	(349.3)
Business cost of crime and violence index	2,300***	212.6**	292.4	2,805***
	(74.03)	(94.04)	(206.0)	(306.6)
Macroeconomic condition (Pillar 3)				
Gross national savings index	325.5***	65.12***	61.08**	451.7***
	(10.76)	(13.67)	(29.94)	(44.56)
Inflation index	170.2***	52.12***	35.63*	257.9***
	(6.756)	(8.583)	(18.80)	(27.98)
Higher Education and Trainings (Pillar 5)				
Tertiary education enrollment index	-626.9***	37.38*	-141.5***	-731.0***
	(15.30)	(19.44)	(42.58)	(63.38)
Avail. of research and training services index	5,148***	460.3**	932.7**	6,541***
	(155.0)	(196.9)	(431.3)	(641.9)
Market Efficiency (Pillar 6)				
Total tax rate index	-489.1***	-67.46***	-83.01*	-639.6***
	(16.48)	(20.93)	(45.85)	(68.24)
o._cons	0	0	0	0
	(0)	(0)	(0)	(0)
Observations	45	45	45	45
R-Squared	1	1	1	1
Number of country_id2	5	5	5	5

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

(g) Impact of access to fixed internet service (i.e. number of fixed internent broadband subscriptions per annum) in East African countries

Statistical significance of access to fixed internet subscriptions per annum in East African countries is presented by Regresion models 1 (Manufacturing FDI), 2 (Extraction FDI), 3 (Service FDI) and 4 (Total FDI) in Table 18.

It is seen that the increase in number of fixed internet broadband subscriptions in control of quality of institutions, macroeconomic condition, higher education and trainings and market efficiency does not have any statistical effect to the inflows of manufacturing FDI, service FDI, extraction FDI and consequently total inflows (see Regression table 20 below)

Table 20: Regression results of number of internet subscriptions (i.e. specific physical infrastructure) and pillars of competitiveness against inflows of total and sector FDI in East African countries for the period of 2006- 2014

VARIABLES	(1) Manu FDI	(2) Service FDI	(3) Extraction FDI	(4) Total FDI
Access to Fixed Internet Service				
Number fixed broadband subscriptions	0.000878	0.00430	-0.00536	-0.000185
	(0.00267)	(0.00456)	(0.00593)	(0.0131)
Quality of Institutions (Pillar 1)				
Strength of investor protection index	-1,942***	31.47***	14.03**	-1,897***
	(2.911)	(4.970)	(6.469)	(14.25)
Business cost of crime and violence index	2,127***	-30.38***	-3.471	2,093***
	(1.848)	(3.155)	(4.107)	(9.046)
Macroeconomic condition (Pillar 3)				
Gross national savings index	298.6***	6.152	43.71***	348.5***
	(4.708)	(8.039)	(10.46)	(23.05)
Inflation index	154.0***	4.788***	34.12***	192.9***
	(0.691)	(1.180)	(1.535)	(3.382)
Higher Education and Trainings (Pillar 5)				
Tertiary education enrollment index	-588.8***	-63.73***	68.32***	-584.2***
	(6.451)	(11.02)	(14.34)	(31.58)
Avail. of research and training service index	4,773***	201.3***	77.23	5,051***
	(30.63)	(52.29)	(68.06)	(149.9)
Market Efficiency (Pillar 6)				
Total tax rate index	-449.6***	-7.172**	-24.36***	-481.2***
	(2.073)	(3.539)	(4.606)	(10.15)
o._cons	0	0	0	0
	(0)	(0)	(0)	(0)
Observations	45	45	45	45
	1	1	1	1
Number of country_id2	5	5	5	5

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3 General Summary of findings

This study complies with the proposition that poor quality of infrastructure (such as road networks, rail lines, port and electricity services and ICT services) is one of the main reasons for the failure of most African countries despite their strategic positions and success of most European countries in attracting foreign investments (Tembe and Xu, 2012); (Kinda, 2010). In summary, the findings were as follows:-

4.3.1 Correlation between infrastructure stock and FDI inflow

This study used Infrastructure index of a country as a measure of infrastructure stock in that country. The findings show that infrastructure index has positive significance in attracting FDI inflows in European, African and East African countries. The analysis describes that countries with highest infrastructure stock are most competitive in attracting foreign investments (Rehman et al., 2011), hence infrastructure index in European countries[4] was most influential than in African countries[5]. Moreover, the findings that the influence of infrastructure index in attracting FDI in East Africa is lower than the overall influence for

[4] European countries in this study are referred to countries with highest infrastructure stock
[5] African countries in this study are referred to as countries with lowest infrastructure stock

Africa confirms the proposition by (AfDB, 2013) that East African infrastructure by average lags behind other African sub-regions.

4.3.2 Correlation between surface transportations and FDI inflow

This study used quality of available road networks, rail lines and port services in use in a country as a measure of available surface transportation facilities and services in that country. The findings show that quality of available surface transportation services has much positive significance in attracting FDI inflows in African and East African countries due to the argument that *''the start-up cost of doing business is less if the host country is able to provide efficient transportation systems and other public infrastructure''* (Erenburg, 1993) in (Ahmad et al., 2015.pp.585) and less in European countries because the latter is not the motivator but an indicator of attracting foreign investments. The analysis describes that quality of road networks have significant influence in European and East African countries; while railway and port services have significant influence in African and East African countries and negative significance in European countries. This can be explained by de-industrialization[6] process in developed world and industrialization in developing world as a strategy to lower costs of production.

4.3.3 Correlation between air transportation and FDI inflow

This study used quality of air transportation services of a country as a measure of air transportation in that country. The findings show that quality of air transportation services has positive significance in attracting FDI inflows in European, African and East African countries. The analysis describes that countries with efficient air transportation services attract more foreign investments; hence the indicator is more influential in European countries than in African countries.

4.3.4 Correlation between electricity supply and FDI inflow

This study used availability of reliable electric supply service in a country as a measure of quality of electricity supply service in that country. The findings show that quality of electricity supply service has positive significance in attracting FDI inflows in African and East African countries. The analysis describes that the indicator is more influential in African countries than in East African countries.

4.3.5 Correlation between telecommunication services and FDI inflow

This study used number of mobile telephone and fixed internet subscriptions as a measure quality of available ICT services in a country. The findings show that number of internet subscriptions has positive significance in attracting FDI inflows in European countries; while number of mobile telephone subscriptions has positive significance only in East Africa

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[6] Deindustrialization is the process of social and economic change caused by reduction of industrial activities (especially heavy or manufacturing) in a country or region.

Chapter 5: Conclusions and recommendations

5.1 Introduction

This chapter explains the findings obtained while answering research sub-questions in Chapter 4. It tries to relate the findings with theories underpinning the study and existing literatures reviewed in Chapter 2. By so doing it aims to answer the main research question which was to examine if physical infrastructure is crucial determinant in attracting FDI in East Africa, Africa and Europe. The study is set to test the applicability of the Eclectic theory to the inflow of FDI in East Africa, Africa and Europe. In order to come up with reliable findings, the study has covered five countries out of six in East Africa, thirty two countries out of fifty four in Africa and thirty seven out of fifty in Europe. Both inferential and descriptive analyses have been applied to examine the contribution of adequacy of transportation network (i.e. depth of road network), impact of physical infrastructure stock (i.e. physical infrastructure indices when including/ excluding internet) and impact of specific physical infrastructure (i.e. quality of roads, quality of railway, quality of port, quality of air transportation, quality of electricity supply, number of mobile subscriptions and number of fixed internet subscriptions) in attracting Greenfield FDI.

5.2 Discussion

5.2.1 Contribution of adequacy of transportation network to the inflow of FDI in East Africa, Africa and Europe

Adequacy of transportation network is argued to be important for growth of FDI inflows because it facilitates smooth operations of FDI and access to domestic and global markets. This study has applied depth of road networks as an indicator for adequacy of transportation network. The proxies for depth of road networks are segment angular choice and segment angular integration which were generated through graph analysis of Axial maps of roads for every country covered by using DepthMap of Space Syntax and ArcToolbox of ArcMap.

In order to examine the contribution of choice and integration in attracting FDI; multiple regression analysis was carried in which total FDI was the dependent variable while choice/integration and eleven pillars of competitiveness were independent variables. The output of the multiple regressions showed that:-

Influence of segment angular choice: It was revealed that in the control of pillars of competitiveness, the variable is positively significant in Europe and Africa; while it has no statistical effect in East Africa. Since segment angular choice measures the passing flows torwards destination; a space with higher value is the busier one hence is the preferred destination of investment due to generated multiplier effect from frequent movements. This argument justifies the proposition that countries with higher choice values due to adequate transportation networks attract more FDI than the ones with lower choice values.

Influence of segment angular integration: It was revealed that in the control of pillars of competitiveness, the variable is positively significant in Africa and East Africa; while it is negatively significant in Europe. Since segment angular integration measures how close space is to all other spaces in the defined radius in terms of ease access torward destination, therefore space with higher value means is distant from other spaces hence has low degree of integration. Being the case, places with high degree of integration are those with lowest value of integration (i.e. are close to all other places), a condition which promotes FDI inflow to the

space. Thus, the higher the value of average segment angular integration from road network indicates that the place is distant form other places (i.e. low degree of integration) hence is disadvantaged for FDI inflows. This argument justifies the findings that in European countries integration correlates negatively with total FDI because graph analysis of Axial road network maps for countries show high integration values for countries which means that every space is located a distant away from all other spaces due to existing dense road network (dense road network provides multiple options of routes, some are longest and some are shortest), a condition which reduces total FDI inflow.

Summary: Therefore, the results above point out that location of a place in relation to other places within a predefined radius affect its locational advantage in different ways. It can make it as an important space of connection by making it with more passing flows or avoiding it to make it distant from other places. The first scenario favors FDI inflows as it makes the place busier while the second reduces FDI inflows as it lowers integration of the place.

5.2.2 Impact of physical infrastructure stock to the inflow of FDI in East Africa, Africa and Europe

There are ample literatures which propose that physical infrastructure stock is crucial for the inflow of FDI because it lowers costs of production and therefore maximizes business profits. Adequacy of transportation network is argued to be important for growth of FDI inflows because it facilitates smooth operations of FDI and access to domestic and global markets. One of the recent studies was the one done by (Ahmad et al., 2015.pp 585) which emphasizes infrastructure stock as *''the driving force in the flow of FDI into a country''*.

This study has applied cumulative impact of quality of road networks, quality of railway, quality of port, quality of air transportation, quality of electricity supply, number of mobile subscription and number of fixed internet subscriptions to examine the importance of physical infrastructure stock to the inflow of FDI. The proxies for physical infrastructure stock are physical infrastructure index including internet and physical infrastructure index excluding internet which have been computed by using GCI values of the named indicators. This computation used the P2 distance index and a synthetic index that combines all of the required indicators into a single value (Garcia et al., 2015).

In order to examine the impact of physical infrastructure index including internet and physical infrastructure index excluding internet in attracting FDI; multiple regression analysis was carried in which total FDI was the dependent variable while physical infrastructure indices and eleven pillars of competitiveness were independent variables. The output of the multiple regressions showed that:-

Influence of physical infrastructure index including internet: It was revealed that in the control of pillars of competitiveness, the adequacy of physical infrastructure stock when there is internet services is positively significant in Africa, Europe and East Africa. However, when its effect is examined in Africa and Europe; it is observed that the variable has more impact in Europe than in Africa as its improvement by 1 unit in both regions, attract the inflows about four times more in Europe than in Africa. This difference is due to the fact that Europe has more efficient and adequate physical infrastructure than Africa.

Moreover, it has shown that the influence of physical infrastructure index including internet is much more than in East Africa than in both European and African regions. Statistics showed that in control of pillars of competitiveness, the increase by 1 unit of physical infrastructure stock when there is internet services in East Africa attract inflows of FDI about four times more than in Europe and about sixteen times more than in whole Africa. This is because service sector is the most growing sector in East Africa, and receives 45% of total FDI inflows in East Africa. Refer table 21 below

Table 21: Statistical influence of physical infrastructure index with internet when it increase by 1 unit in control of pillars of competitiveness

Na.	Region	Statistical effect	Predicted units
1.	East Africa	Positive	3,999.00
2.	Africa	Positive	253.90
3.	Europe	Positive	1,006.00

Summary: The comparison from the statistical findings for Europe and Africa propose that both indices for physical infrastructure stock (one in absence/the other in presence of internet services) predict more inflows of foreign investments in European countries than in African countries. This is because European countries have relatively high level of adequacy and efficiency of physical infrastructure stock as compared to African countries.

Influence of physical infrastructure index excluding internet: It was revealed that in the control of pillars of competitiveness, the adequacy of physical infrastructure stock when there is no internet services is positively significant in Africa, Europe and East Africa. However, when its effect is examined by comparing Africa and Europe; it is observed that the variable has more impact in Europe than in Africa as its improvement by 1 unit in both regions, attract the inflows about three times more in Europe than in Africa. This difference is due to the fact that Europe has more efficient and adequate physical infrastructure than Africa.

Moreover, it has shown that the influence of physical infrastructure index when there is no internet is much less in East Africa than in both European and African regions. Statistics showed that in control of pillars of competitiveness, the increase by 1 unit of physical infrastructure stock when there is no internet services in East Africa attract inflows of FDI about thirteen times less than in Europe and about four times less than in whole Africa. This is because the region is experiencing stagnation of inflows in manufacturing sector which are promoted by these kind of infrastructure. In East Africa, inflows in manufacturing sector is the lowest, it is at 20% of total FDI inflows. Refer table 22 below

Table 22: Statistical influence of physical infrastructure index without internet when it increases by 1 unit in control of pillars of competitiveness

Na.	Region	Statistical effect	Predicted units
1.	East Africa	Positive	115.60
2.	Africa	Positive	491.00
3.	Europe	Positive	1,456.00

Summary: The comparison from the statistical findings for Europe and Africa propose that index for physical infrastructure stock in absence of internet services predict more inflows of

foreign investments in European countries than in African countries. This is because European countries have relatively high level adequacy and efficiency of physical infrastructure stock as compared to African countries.

5.2.3 Impact of specific physical infrastructure to the inflow of FDI in East Africa, Africa and Europe

It has been argued that physical infrastructure is among the crucial location determinants which influences the patterns of FDI (Dunning et al., 1992; Dunning & Narula, 1996; Dunning & Lundan, 2008); (Ajitabh & Momaya, 2004); (Dunning, 1988). Therefore, this sub-question tries to find out the contribution of specific physical infrastructure namely road networks, railway, ports, air transportation, electricity supply, mobile telephone service and fixed internet services in influencing the patterns of FDI. In so doing, this sub-question contribute to answers of the main research question which is to examine the whether physical infrastructure as is the crucial determinant of FDI inflows as it has been proposed by Dunning (1988) in his theory of FDI (Eclectic theory). In his theory, Dunning (1988) put forward the OLI Paradigm which acknowledges locational advantages such as presence of infrastructure as features which influence the inflows of FDI as their presence facilitate firms' business operations and growth in the host country. Therefore, this part tries to uncover which specific physical infrastructure among the seven is most influential in East Africa, Africa and Europe.

Therefore, this part has studies singly the impact of quality of road networks, quality of railway, quality of port, quality of air transportation, quality of electricity supply, number of mobile subscription and number of fixed internet subscriptions to examine which among them has more influence to the inflow of FDI. The proxies used are quality of road network, quality of railway, quality of ports, quality of air transportation, quality of electricity supply, number of mobile telephone subscriptions and number of fixed internet subscriptions which have been obtained from the GCI report 2013-2014.

In order to examine the impact of every single specific physical infrastructure in attracting FDI; multiple regression analysis was carried in which transportation FDI and manufacturing FDI were used for Europe and Africa respectively; while manufacturing FDI, service FDI, extraction FDI and total FDI were used in East Africa as the dependent variable while physical proxies of specific physical infrastructure each at a time and eleven pillars of competitiveness were independent variables. The output of the multiple regressions showed that:-

Influence of quality of air transportation infrastructure: It was revealed that in the control of pillars of competitiveness, the quality of air transportation infrastructure is positively significant in both regions Europe and Africa. Further analysis was done for East Africa by using FDI inflow in all three main sectors i.e. manufacturing, service and extraction. The results showed that the variable is positively significant in attracting manufacturing FDI and negatively significant in attracting service FDI. Moreover, it had no impact for extraction FDI and total FDI. Refer table 23 below

Table 23: Statistical influence of quality of air transportation when it improves by 1 unit control of pillars of competitiveness

Na.	Region	Type of FDI	Statistical effect	Predicted units
1.	East Africa	Manufacturing	Positive	89.20
		Service	Negative	78.11
		Extraction	None	0.00
2.	Africa	Manufacturing	Positive	172.80
3.	Europe	Transportation	Positive	154.50

Influence of quality of railway: It was revealed that in the control of pillars of competitiveness, the quality of railway infrastructure is positively significant in Africa and negatively significant in Europe. Further analysis was done for East Africa by using FDI inflow in all three main sectors i.e. manufacturing, service and extraction. The results showed that the variable is positively significant in attracting all types of FDI i.e. manufacturing FDI, service FDI and extraction, hence total FDI too. Refer table 24 below

Table 24: Statistical influence of quality of railway infrastructure when it improves by 1 unit in control of pillars of competitiveness

Na.	Region	Type of FDI	Statistical effect	Predicted units
1.	East Africa	Manufacturing	Positive	4,669.00
		Service	Positive	244.60
		Extraction	Positive	15.31
2.	Africa	Manufacturing	Positive	242.00
3.	Europe	Transportation	Negative	67.93

Influence of quality of port infrastructure: It was revealed that in the control of pillars of competitiveness, the quality of port infrastructure is positively significant in Africa and negatively significant in Europe. Further analysis was done for East Africa by using FDI inflow in all three main sectors i.e. manufacturing, service and extraction. The result showed that the variable is positively significant in attracting manufacturing FDI, extraction FDI and total FDI. The variable was insignificant in attracting service FDI. Refer table 25 below

Table 25: Statistical influence of quality of port infrastructure when it improves by 1 unit in control of pillars if competitiveness

Na.	Region	Type of FDI	Statistical effect	Predicted units
1.	East Africa	Manufacturing	Positive	88.86
		Service	None	0.00
		Extraction	Positive	472.90
2.	Africa	Manufacturing	Positive	170.50
3.	Europe	Transportation	Negative	65.01

Influence of quality of road networks: It was revealed that in the control of pillars of competitiveness, the quality of road network is positively significant in Europe and not significant in Africa. Further analysis was done for East Africa by using FDI inflow in all three main sectors i.e. manufacturing, service and extraction. The results showed that the

variable is positively significant in attracting manufacturing FDI and service FDI. Moreover, it had no impact for extraction FDI and total FDI. Refer table 26 below

Table 26: Statistical influence of quality of rod networks when it improves by 1 unit in control of pillars of competitiveness

Na.	Region	Type of FDI	Statistical effect	Predicted units
1.	East Africa	Manufacturing	Positive	79.35
		Service	Positive	397.80
		Extraction	None	0.00
2.	Africa	Manufacturing	None	0.00
3.	Europe	Transportation	Positive	108.30

Influence of number of fixed internet subscriptions: It was revealed that in the control of pillars of competitiveness, the number of fixed internet subscriptions is positively significant in Europe and not significant in Africa. Further analysis was done for East Africa by using FDI inflow in all three main sectors i.e. manufacturing, service and extraction. The result showed that the variable is neither positively nor negatively significant in attracting all three types of FDI. Therefore, it had no impact for total FDI too. Refer table 27 below

Table 27: Statistical influence of number of fixed internet subscriptions when it improves by 1 unit in control of pillars of competitiveness

Na.	Region	Type of FDI	Statistical effect	Predicted units
1.	East Africa	Manufacturing	None	0.00
		Service	None	0.00
		Extraction	None	0.00
2.	Africa	Manufacturing	None	0.00
3.	Europe	Transportation	Positive	4.15

Influence of quality of electricity supply: It was revealed that in the control of pillars of competitiveness, the quality of electricity supply infrastructure is positively significant in Africa and not significant in Europe. Further analysis was done for East Africa by using FDI inflow in all three main sectors i.e. manufacturing, service and extraction. The result showed that the variable is positively significant in attracting manufacturing FDI, extraction FDI and total FDI. Moreover, it was insignificant in attracting service FDI. Refer table 28 below

Table 28: The statistical influence of quality of electricity supply when it improves by 1 unit control of pillars of competitiveness

Na.	Region	Type of FDI	Statistical effect	Predicted units
1.	East Africa	Manufacturing	Positive	109.40
		Service	None	0.00
		Extraction	Positive	839.40
2.	Africa	Manufacturing	Positive	219.90
3.	Europe	Transportation	None	0.00

Influence of number of mobile telephone subscriptions: It was revealed that in the control of pillars of competitiveness, the number of mobile telephone subscriptions is negatively significant in Europe and not significant in Africa. Further analysis was done for East Africa by using FDI inflow in all three main sectors i.e. manufacturing, service and extraction. The result showed that the variable is positively significant in attracting manufacturing FDI, service FDI and total FDI. Moreover, it was insignificant in attracting extraction FDI. Refer table 29 below

Table 29: Statistical influence of number of mobile telephone subscriptions when it improves by 1 unit in control of pillars of competitiveness

Na.	Region	Type of FDI	Statistical effect	Predicted units
1.	East Africa	Manufacturing	Positive	5.53
		Service	Positive	6.73
		Extraction	None	0.00
2.	Africa	Manufacturing	None	0.00
3.	Europe	Transportation	Negative	3.20

Summary: The comparison from the statistical findings for Europe and Africa propose that most of proxies for physical infrastructure have influence to inflows of foreign investments. This is because physical infrastructure facilitates business operations by lowering operation costs and market penetrations. With that effect, the physical infrastructure promotes locational advantages of the regions and hence inflows of FDI.

5.3 Conclusion

From discussion of analysis above, this study has observed the following:-

- *Contribution of adequcacy of transportation network:* This variable was proxied with two indicators namely segment angular choice and segment angular integration. In the control of pillars of competitiveness, segment angular choice is positively significant in Europe and Africa; while it has no statistical effect in East Africa. Meanwhile, segment angular integration is positively significant in Africa and East Africa; while it is negatively significant in Europe.

- *Cumulative impact of physical infrastructure stock:* This variable was proxied with two indicators namely physical infrastructure index with internet and physical infrastructure index without internet. In control of pillars of competitiveness, both proxies predict more inflows of foreign investments in Europe, Africa and East Africa.

- *Impact of specific physical infrastructure:* This variable was proxied with seven indicators namely quality of roads, railway, ports, air transportation, electricity supply, number of mobile telephone and fixed internet subscriptions. In control of pillars of competitiveness, it was found that the impacts of different types of physical infrastructure differe in different regions. However, basing on their general impacts to inflow of FDI; this study can arrange them in the following order; quality of railway, quality of air transportation, quality of port, quality of road networks, quality of electricity supply, number of mobile telephone subscriptions and number of fixed internet subscriptions.

5.4 Recommendation

This study has examined the importance of physical infrastructure in attracting FDI in East Africa by benchmarking it with Africa and Europe. Some findings complied with existing literatures and some did not. Therefore, the following recommendations are put forward:-

Policy recommendation: Currently, FDI inflow has become the main source for foreign capital in many countries in the world. Both developed and developing countries are improving their business environments in order to attract more FDI for their economic development. One of the key areas of focus has been establishment of effective physical infrastructure such as roads network, railway, ports, air transportation, electricity supply, access to mobile telephone service and access to fixed internet service. Since such projects consume large shares of government budgets; this study may provide facts that are useful to decision makers about impacts of specific infrastructure in attracting FDI. In that case, the study can assist in prioritization of certain types of infrastructure depending on country's potentiality to certain types of FDI.

For East Africa, most of FDI are resource-seeking and market-seeking; therefore in order to maximize their locational advantages via physical infrastructure establishments it is advised to focus more on railway transportation by upgrading their railway transportation network to standard gauge and increase connections so as to facilitate mobility of factors of production, reduce costs of business operations and maximize penetration to domestic and foreign markets.

Areas for further studies: Most of the results in this study can be explained with the Eclectic theory by using one of the three components of the OLI Paradigm i.e. locational advantages as was put forward by Dunning (1988). However, there were results which could not be explained by the Eclectic theory. Therefore, this study recommends further studies in such areas so that scientific expaination on their deviation from the theory are put forward. One of the results which could not be explained by Eclectic theory and need further investigation was the significance of quality of railway infrastructure to show negative influence to the inflow of transportation FDI in Europe. Another result which need further study is the influence of internet service to inflow of FDI in East Africa and Africa which showed no effect in all types of FDI. This is interesting because East Africa's and Africa's FDI inflows are expected to be affected by internet services because the regions receive large share of service FDI especially in ICT sector.

Bibliography

AfDB. (2013). *State of infrastructure in east Africa*. Abidjan: African Development Bank.

Ahmad, N. A., Ismail, N. W., & Nordin, N. (2015). The impact of infrastructure on foreign direct investment in Malaysia. *International Journal of Management Excellence, 5*(1), 584-590.

Ajitabh, A., & Momaya, K. S. (2004). Competitiveness of firms: Review of theory, frameworks, and models. *Singapore Management Review, 26*(1), 45-61.

Aschauer, D. A. (1989). Is public expenditure productive? *Journal of Monetary Economics, 23*(2), 177-200.

Asiedu, E. (2002a). On the determinants of foreign direct investment to developing countries: Is Africa different? *World Development, 30*(1), 107-119.

Asiedu, E. (2002b). On the determinants of foreign direct investment to developing countries: Is Africa different? *World Development, 30*(1), 107-119.

Asiedu, E. (2004). Policy reform and foreign direct investment in Africa: Absolute progress but relative decline. *Development Policy Review, 22*(1), 41-48.

Asiedu, E. (2006). Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions and political instability. *The World Economy, 29*(1), 63-77.

Assunção, S., Forte, R., & Teixeira, A. A. (2013). Location determinants of FDI: Confronting theoretical approaches with empirical findings. *Argumenta Oeconomica, 31*(2), 5-28.

Bakar, N., Che Mat, S., & Harun, M. (2012). The impact of infrastructure on foreign direct investment: The case of malaysia.*65*, 205-211.

Bakoup, F. (2013). *Promoting economic reforms in developing countries: Rethinking budgetary aid?* African Development Bank.

Balassa, B. (1994). *The theory of economic integration: An introduction* Springer.

Bende-Nabende, A. (2002). Foreign direct investment determinants in sub-Sahara Africa: A co-integration analysis. *Economics Bulletin, 6*(4), 1-19.

Bevan, A. A., & Estrin, S. (2004). The determinants of foreign direct investment into European transition economies. *Journal of Comparative Economics, 32*(4), 775-787.

Castro, L. (2008). Infrastructure and the location of foreign direct investment: A region analysis. *MPRA*, 29-02-2016.

Craig Pirrong. (2014). *The economics of commodity trading firms*. Houston: Trafigura.

Crespo, N., & Fontoura, M. P. (2007). Determinant factors of FDI spillovers–what do we really know? *World Development, 35*(3), 410-425.

Dabour, N. (2000). The role of foreign direct investment in development and growth in OIC member countries.*21*(3), 27-55.

Daniel, A. (2010). Foreign direct investment in east Africa. a comparative analysis of its investment laws.

De Mello Jr, Luiz R. (1997). Foreign direct investment in developing countries and growth: A selective survey. *The Journal of Development Studies, 34*(1), 1-34.

Demirhan, E., & Masca, M. (2008a). Determinants of foreign direct investment flow to developing countries: A cross-sectional analysis. *Prague Economic Papers, 4*, 356-369.

Demirhan, E., & Masca, M. (2008b). Determinants of foreign direct investment flow to developing countries: A cross-sectional analysis. *Prague Economic Papers, 4*(2008), 356-369.

Dunning, J. H. (1988). The eclectic paradigm of international production: A restatement and some possible extensions. *Journal of International Business Studies*, 1-31.

Dunning, J. H., Buckley, P. J., & Casson, M. (1992). *Multinational enterprises in the world economy: Essays in honor of john dunning* Edward Elgar Pub.

Dunning, J. H., & Lundan, S. M. (2008). *Multinational enterprises and the global economy* Edward Elgar Publishing.

Dunning, J. H., & Narula, R. (1996). The investment development path revisited. *Foreign Direct Investment and Governments: Catalysts for Economic Restructuring*, 1-41.

Erden, L., & Holcombe, R. G. (2005). The effects of public investment on private investment in developing economies. *Public Finance Review, 33*(5), 575-602.

Erenburg, S. J. (1993). The real effects of public investment on private investment. *Applied Economics, 25*(6), 831-837.

Faeth, I. (2009). Determinants of foreign direct investment–a tale of nine theoretical models. *Journal of Economic Surveys, 23*(1), 165-196.

Filo, C. (2008). Territorial competitiveness and the human factors. *In International Conference of Territorial Intelligence, Huelva 2007.* pp. p. 323-336.

Fung, K. C., Garcia-Herrero, A., Iizaka, H., & Siu, A. (2005). Hard or soft? institutional reforms and infrastructure spending as determinants of foreign direct investment in china. *Japanese Economic Review, 56*(4), 408-416.

Ghose, A. K. (2004). *Capital Inflows and Investment in Developing Countries,*

Godley, W. (1999). Money and credit in a Keynesian model of income determination. *Cambridge Journal of Economics, 23*(4), 393-411.

Goel, D. (2003). Impact of infrastructure on productivity: Case of Indian registered manufacturing. *Indian Economic Review*, 95-113.

Harzing, A., & Giroud, A. (2014). The competitive advantage of nations: An application to academia. *Journal of Informetrics, 8*(1), 29-42.

Haughwout, A. (2001). Infrastructure and social welfare in metropolitan America. *Economic Policy Review, 7*(3)

Holtz-Eakin, D., & Schwartz, A. E. (1995a). Infrastructure in a structural model of economic growth. *Regional Science and Urban Economics, 25*(2), 131-151.

Holtz-Eakin, D., & Schwartz, A. E. (1995b). Spatial productivity spillovers from public infrastructure: Evidence from state highways. *International Tax and Public Finance, 2*(3), 459-468.

Holtz-Eakin, D., & Smeeding, T. M. (1994). Income, wealth, and intergenerational economic relations of the aged. *Demography of Aging*, 102-145.

Infrastructure Consortium for Africa. (2014). *Infrastructure financing trend in Africa 2013.* Tunis Belvedere, Tunisia: ICA Secretariat c/o African Development Bank.

Iwanow, T., & Kirkpatrick, C. (2006). *Trade Facilitation, Regulatory Quality and Export Performance: A Panel Data Gravity Model Approach,*

Jeon, Y. (1992). The determinants of Korean foreign direct investment in manufacturing industries. *Weltwirtschaftliches Archiv, 128*(3), 527-542.

Khadaroo, J., & Seetanah, B. (2009). The role of transport infrastructure in FDI: Evidence from Africa using GMM estimates. *Journal of Transport Economics and Policy (JTEP), 43*(3), 365-384.

Kindleberger, C. P. (1969). American business abroad. *The International Executive, 11*(2), 11-12.

König, J. (2014). *Measuring European Economic Integration,*

Moore, M. G. (1993). 2 theory of transactional distance. *Theoretical Principles of Distance Education*, 22.

Moosa, I. (2016). *Foreign direct investment: Theory, evidence and practice* Springer.

Mooya, M. M. (2003). Determinants of foreign direct investment: Theory and evidence, with Zambia as case study.

Mottaleb, K. A., & Kalirajan, K. (2010). Determinants of foreign direct investment in developing countries a comparative analysis. *Margin: The Journal of Applied Economic Research, 4*(4), 369-404.

Murths, T., & Lenway, S. (1998). Country capabilities and the strategic state: How national political institutions affect MNC strategies. *Strategic Management Journal, 15*(5), 113-119.

Mwenya, A. (2013). *FDI and city competitiveness within the southern African development community (SADC): The case of Lusaka city-Zambia.* Unpublished Master's programme in urban management and development, International Institute of Urban Management of Erasmus University Rotterdam, Rotterdam.

Nadiri, M. I., & Mamuneas, T. P. (1994). *Infrastructure and Public R&D Investments, and the Growth of Factor Productivity in US Manufacturing Industries,*

Nayak, D., & Choudhury, R. N. (2014). *A Selective Review of Foreign Direct Investment Theories,*

Organisation for Economic Co-operation and Development. (2009). *OECD benchmark definition of foreign direct investment 2008* OECD Publishing.

Porter, M., Sala-i-Martin, X., & Schwab, K. (2007). World economic forum: The global competitiveness report.

Rehman, C. A., Ilyas, M., Alam, H. M., & Akram, M. (2011). The impact of infrastructure on foreign direct investment: The case of Pakistan. *International Journal of Business and Management, 6*(5), 268.

Rodrik, D. (1998). *Trade Policy and Economic Performance in Sub-Saharan Africa,*

Romer, P. (1993). Idea gaps and object gaps in economic development. *Journal of Monetary Economics, 32*(3), 543-573.

Root, F. R., & Ahmed, A. A. (1979). Empirical determinants of manufacturing direct foreign investment in developing countries. *Economic Development and Cultural Change,* , 751-767.

Samaratunga, R., & Weerasinghe, E. (2002). Economic integration: A review of the concept.

Schneider, F., & Frey, B. S. (1985). Economic and political determinants of foreign direct investment. *World Development, 13*(2), 161-175.

Sekkat, K., & Veganzones-Varoudakis, M. (2007). Openness, investment climate, and FDI in developing countries. *Review of Development Economics, 11*(4), 607-620.

SHAH, M. H. (2014). The significance of infrastructure for FDI inflow in developing countries. *Journal of Life Economics (e-ISSN: 2148-4139), 2*(2), 1-16.

Shenkar. (2007). Foreign direct investment: Theory and application chapter 3., 59-92.

Thiel, S. v. (2014). Research methods in public administration and public management.

Tinbergen, J. (1954). International economic integration.

UNCTAD. *Www.unctad.org/en.*, 2016, from http://unctad.org/en/Pages/Statistics.aspx

UNCTAD. (2015). *World investment report 2015: Reforming international investment governance*. Geneva: United Nations.

UN-Habitat. (2014). *The state of African cities report 2014: Re-imagining sustainable urban transitions governance, inequality and urban land markets*. Nairobi: UN-Habitat.

United Nations. (1998). *World investment report 1998: Trends and determinants overview*. New York: United nations.

Verschuren, P., Doorewaard, H., Poper, R., & Mellion, M. (2010). *Designing a research project* Eleven International Publishing The Hague.

Voulgaris, F., Asteriou, D., & Agiomirgianakis, G. (2003). The determinants of small firm growth in the greek manufacturing sector. *Journal of Economic Integration,* , 817-836.

Wall, R. S., & Van der Knaap, G. (2011). Sectoral differentiation and network structure within contemporary worldwide corporate networks. *Economic Geography, 87*(3), 267-308.

Wall, R., Burger, M. J., & Knapp, G. A. (Bert) van der. (2011). The geography of global corporate networks : The poor, the rich and the happy few countries. *Environment and Planning A, 43*(4), 904-927.

Wheeler, D., & Mody, A. (1992). International investment location decisions: The case of US firms. *Journal of International Economics, 33*(1), 57-76.

World Bank. (1994). *World development report 1994: Infrastructure for development*. New York: Oxford University Press.

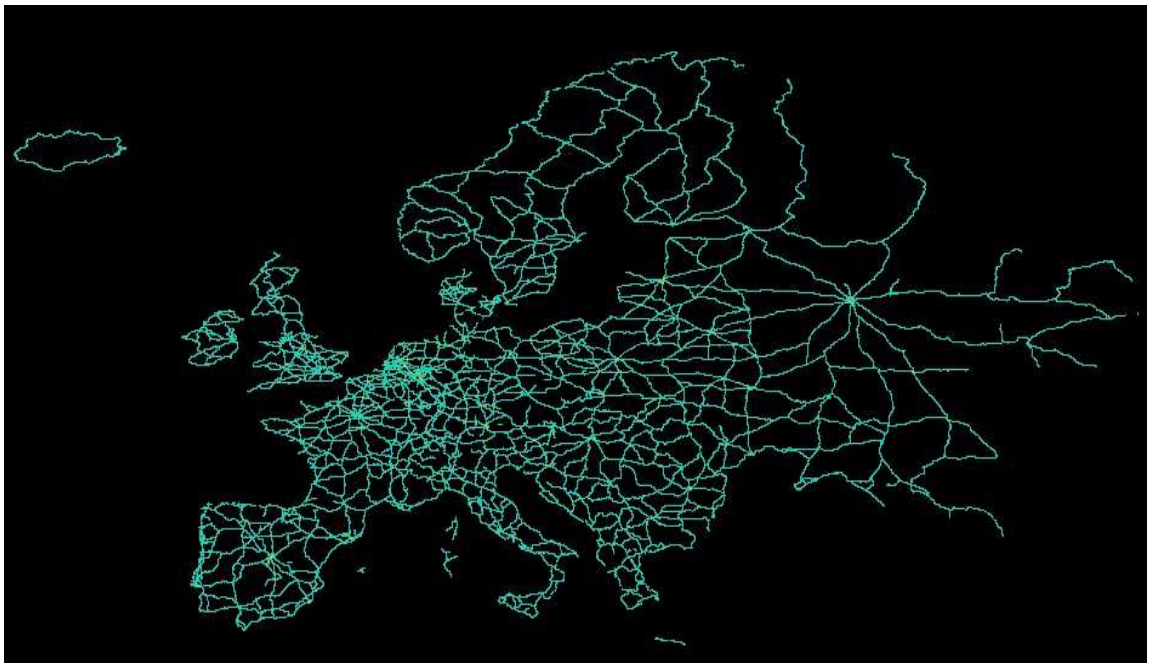
World Bank. (2015). *The Africa competitive report 2015*. Geneva: World Economic Forum.

Xin-Zhong, L. (2005). Foreign direct investment inflows in china: Determinants at location. *Retrieved from Http://sdocument. Ish-Lyon. Cnrs. fr/cnrs_cass2/sites/www. i-Conf. Org. cnrs_cass2/files/16_Li_Xinzhong. Pdf,*

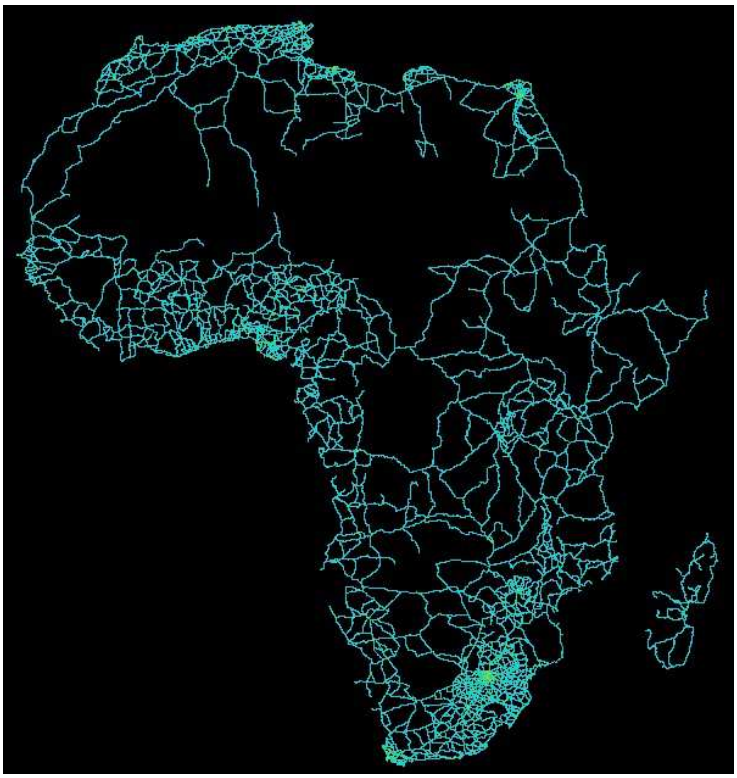
Yol, M. A., & Teng, N. T. (2009). Estimating the domestic determinants of foreign direct investment flows in Malaysia: Evidence from cointegration and error-correction model. *Jurnal Pengurusan, 28*(1), 3-22.

Zvirgzde, D., Schiller, D., & Diez, J. R. (2013). Location choices of multinational companies in transition economies: A literature review. *Deliverable, 2*(1), 1-22.

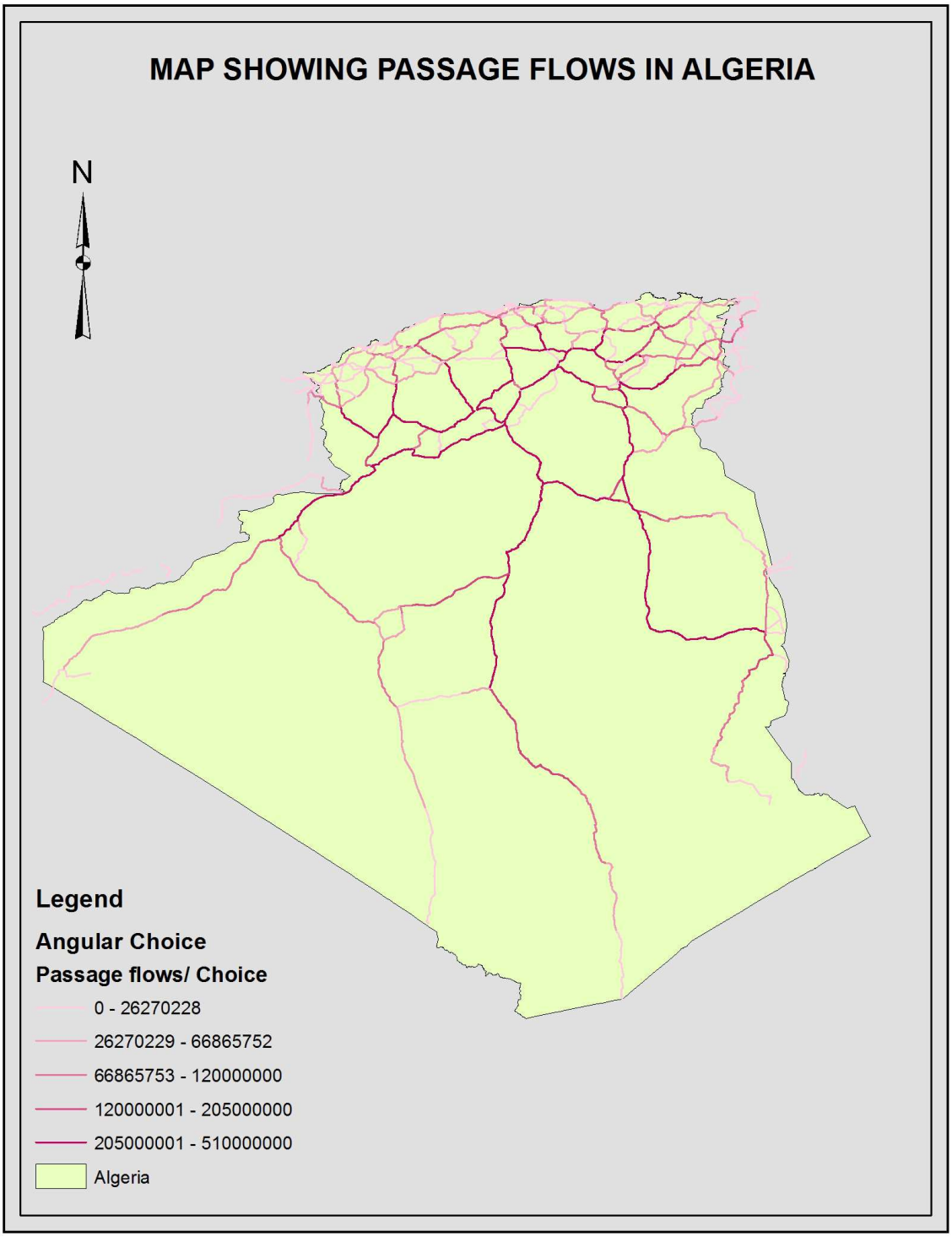
Annex 1: Axial map of European major roads used to generate Segment angular choice and integration



Annex 2: Axial map of African major roads used to generate Segment angular choice and integration



Annex 3: Map of Algeria to show passage flows



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