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Thesis: Infrastructure Networks and Foreign Direct Investment: Hard Connectivity of Lagos – Abidjan Economic Corridor

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Infrastructure networks and foreign direct investment: Hard connectivity of Lagos – Abidjan Economic Corridor

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Dedication

I specially dedicate this Thesis to my late husband Mr Ali T.S Ngada. You taught me to believe in myself and to always aspire to greater heights. I Love you…

Certification

This is to certify that this dissertation titles **"Infrastructure Networks and Foreign Direct Investment: Hard connectivity of Lagos- Abidjan Corridor"** is an original work carried out by Lynda Bitrus Elesa. The work has been supervised, corrected and approved having met the requirement and regulations governing the award for the degree of Masters in Science (M.sc) in Urban Management and Development, Erasmus University Rotterdam, Netherland.

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Summary

Globally, Foreign Direct Investments (FDI) is one of the essential features of the world economy and Global Economic Integration. The availability of Infrastructure is considered as one of the factors that guide the investment decision of Multinational Enterprises and these Enterprises carry out foreign Direct investment. The purpose of this research is to analyse the function of infrastructure network in determining the attractiveness of countries for greenfield FDI. The study analysed the relationship between FDI and the spatial configuration of physical infrastructure network in Africa with emphasis on the Lagos-Abidjan (L-A) Corridor in West Africa by benchmarking Europe and the North Sea Mediterranean (NS-M) corridor by means of space syntax methodology. This benchmark is necessary since West African region, where the L-A corridor is located have consistently perceived European countries and particularly EU as a guide.

Firstly, the network centrality measures of the infrastructure in 40 African countries and 38 European countries were generated using GIS analysis in ARCMAP10.4.1 and space syntax analysis in UCL DepthMapX. Secondly, the network centrality measures of degree centrality (measured by connectivity); closeness centrality (measured by integration); and the betweenness centrality (measured by the choice) were obtained and used in a panel data regression using a random effect model to determine the influence of infrastructure network on the inflow of: (a) Total FDI (obtained from the FDI market of the financial times) into Africa and Europe as well as to L-A and NS-M corridors; (b) FDI inflow into four sectors in Africa namely Hitech, manufacturing, resources and services from 2006 to 2014.

The findings show a strong positive significance of infrastructure network in attracting FDI in both Europe and Africa as well as in NS-M and the L-A corridor. However, variation exists based on Regional Economic Community (REC) and the rate of impact of the infrastructure network, as well as in its interaction with other location and competitiveness factors. The infrastructure network, large market size and Regional Economic Community are essential for FDI attraction in EU member states in Europe whereas FDI to non-EU member states is sensitive to macroeconomic stability, large market size, labour force and institutions. On the other hand, in Africa, infrastructure network and large market size is a determinant of FDI to Sub-Saharan Africa (SSA) whereas, in non-Sub-Saharan Africa(non-SSA), Institution and labour force are the major determinant of FDI inflow. While, in both Africa and Europe, regions with good Regional Economic community(REC) attract more FDI than regions with weak REC. Furthermore, Contrary to Europe that has bridged the gap between coastal and landlocked areas with good infrastructure and logistics services, hence, eliminating the disparity between coastal and land-locked regions, coastal regions in Africa and in SSA in particular attracts more FDI than landlocked areas and infrastructure network is significant for FDI in manufacturing, service and resource sectors in SSA with high elasticity in the manufacturing sector, however its impact and level of significance varies based on region and sub-region. Additionally, French-speaking countries in L-A corridor attract less FDI than English speaking countries. This indicates that improved and well-developed infrastructure is a vital tool for FDI attraction and cross-border trade facilitation by enhancing physical connectivity of countries and improving the investment climate in Africa and Europe as well as the two corridors respectively.

The findings can be useful to Government, Policy Makers and Urban Development Administrators with respect to FDI, Regional and Global Economic Integration. This can be achieved by understanding that infrastructure network has the potential to bridge the gap between coastal regions and the hinterland. It is equally important for international development/donor agencies and countries interested in the construction of new as well as rehabilitation of existing infrastructure to understand its network effect and prioritise accordingly, since infrastructure network can serve as a development tool for both developing and emerging economies. The main novelty of this study lies in the treatment of infrastructure as a spatial network with topological dimension, using GIS and space syntax analysis; using a spatial configuration of infrastructure network measures and a non-spatial unit flow of investment (greenfield FDI) representing the spatial location of MNE's to explain the extent of Global Economic Integration; confronting Infrastructure network with other factors, such as macroeconomic environment, institutions, market size, labour force as well as controlling for strategic location,

ethnolinguistic diversity and Regional Economic Community which also may play a significant role both in FDI attraction in Regional Economic Integration.

Keywords

Infrastructure Network, Greenfield FDI, Global Economic Integration, Productivity, Space syntax. Lagos-Abidjan corridor, North Sea Mediterranean corridor, Europe, Africa

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Abbreviations

AFDB	African Development Bank
APS	Advanced Producer Service
AU	African union
ECOWAS	Economic Community of West African States
FDI	Foreign Direct Investment
GaWC	Global and World City
GCI	Global Competitiveness Index
GCR	Global Competitiveness Report
GEI	Global Economic Integration
ICA	Infrastructure Consortium for Africa
ICT	Information and Communication Technology
IHS	Institute for Housing and Urban Development
L-A	Lagos-Abidjan
LDC	Least Developed Countries
MNE	Multinational Enterprise
NEPAD	New Partnership for African Development
NON-SSA	Non-Sub-Saharan Africa
NS-M	North Sea-Mediterranean
OECD	Organization for Economic Cooperation and Development
PIDA	Programme for Infrastructure Development in Africa
RI	Regional Integration
SSA	Sub-Saharan Africa
SDG	Sustainable Development Goals
WAEMU	West African Economic and Monetary Union
WAMZ	West African Monetary Zone
WCN	The World City Network
WDI	World development Indicators

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Chapter 1: Introduction

1.0 Introduction

This chapter consists of the background which emphasises the importance of infrastructure networks in the functioning and urban competitiveness of cities across the globe. The emphasis on network effect rather than the provision of these hard physical infrastructures is seen to be the backbone of Global Economic Integration (GEI). Hence, deliberate planning, as well as the concise provision of infrastructure within and between economic corridors, can serve as a springboard for African cities into the Global Value Chain by aiding economic diversification.

The chapter further discusses the influence of the infrastructure networks on the choice of location of Multinational Enterprise's (MNE's), as carriers of Foreign Direct Investment (FDI) in Africa and within the Lagos-Abidjan economic corridor. In addition, the aim and objectives of the study; the research questions; the significance of the study; the scope and limitations; as well as the research design are covered in this chapter.

1.1 Background

Globally cities are defined by the quality and networks of the built infrastructure. According to the World Economic Forum (2015), Strong and well developed physical and non-physical infrastructure networks enhance the competitiveness and productivity of an economy. Similarly, Castell (2011), emphasised that the global functions of any city or region are defined by how connected it is to the global network of investments and financial transactions through advance service operations of Multinational Enterprises (MNE's), and expansion of economic and infrastructure base. Moreover, the quality as well as the availability of supportive physical infrastructure is imperative for the smooth functioning of MNE's (Shah,2014) and can significantly lower their transaction cost (Asiedu,2004). This indicates the relevance of infrastructure network to the effective operations of MNE's. Additionally, according to Navaretti et al. (2004), "MNE's carry out FDI" and FDI is defined by IMF (1993, section 359) as an "investment in a foreign company where the foreign investor owns at least 10% of the ordinary shares, undertaking with the objective of establishing a 'lasting interest' in the country, a long time relationship and significant influence on the management of the firm". This indicates that among the diverse activities of MNE's they also engage in Foreign Direct Investment in locations other than their host countries and this enhances the competitiveness of the host country as well as that of the firm. Furthermore, with a global population of about (7.26 billion) people who commute, work, live and communicate by using networks of freeways; wireless networks and telephones; media and cable networks; airports and seaports (Castells, 2011), emphasis on the relevance of infrastructure network and availability in the host country is imperative. These infrastructure networks serve as one of the location pull factor for Foreign Direct Investment (FDI) and FDI is a means of global and local connectivity between locations. Hence, this fosters Global Economic Integration (GEI).

The integration of countries into the global value chain is paramount for Africa as well as the Lagos-Abidjan Corridor, and Reginal Integration (RI) is the first step towards getting a more connected, business friendly and competitive continent. Hence the need to enhance regional integration. Consequently, advancing R.I Leads to large market size, industrialisation, improved productivity, the mobility of goods and people with talent, creativity and innovation across borders (African Union Commission ,2016). However, according to Ben-Ari (2014), Africa is the least integrated continent in the world with a minimal level of intra-regional economic exchange and the least share of global trade. Thus, this integration can be facilitated by investment in infrastructure, which together with a stable economic outlook and good institutions will attract Foreign Direct Investment into non-resource sectors (diversification). Consequently, The drive for diversification of economies for enhanced productivity in Africa and the Lagos-Abidjan Corridor highlights the significant of infrastructure as an important factor for increase in aggregate productivity as well as FDI attraction, and the diversification initiative minimizes reliance on exhaustible natural resources that is subject to various challenges such as resource exhaustion, decline in commodity prices, population growth reduction of available resources, potential risk of substitution with technological advancement amongst others.

Infrastructure networks according to Bruinsma and Rietveld (1993, p. 919) "are often assumed to be important determinants of the economic potential of urban agglomerations". This explains why the most important cities harbour the significant airports; sophisticated road networks and the broad fibre optic backbone network infrastructure that supports the internet are deployed within and amongst major cities, thus creating a vast planetary infrastructure network upon which the global economy depends on (Derudder and Witlox,2008). These network of infrastructures are the foundation on which the connectivity of key cities is established and Multinational Enterprises (MNE's) are attracted to locations with good infrastructure network measured in terms of connectivity, integration and choice as shown by Omer and Goldblatt, (2015), Xia (2013) and Hillier and Iida (2005). Besides, in developed as well as developing countries, the expansion of MNE networks through Foreign Direct Investment (FDI) enhances higher growth and development (Tintin, 2012). Thus, Good infrastructure networks efficiently connect firms to their customers and suppliers; reduce production and transport costs; provide access to information, innovation and knowledge; while enabling the adoption of modern smart services and production technologies (World Economic Forum, 2015). Conversely, inadequate infrastructure networks create segregation and barriers to productive opportunities. This leads to increase in the transaction costs for both domestic and Multinational Enterprise's (MNE's).

The productivity of a network of Multinational Enterprises consisting of companies and suppliers from a particular sector interconnected in geographically proximate groups known as clusters is enhanced by infrastructure networks. These infrastructure networks can heighten their efficiency, provide greater opportunities for innovation, and reduce barriers to entry for new firms (World Economic Forum, 2015). Accordingly, Competitive Industrial/ business districts and regional clusters located in countries, and regions with high productivity focus more on the benefits of localisation and opportunities provided by globalisation, in the Glocal Nexus (Organisation for Economic Cooperation and Development, 2007). Hence, MNE's that utilise the advantages of the local host economy to obtain a position in the global economic hierarchy play prominent roles in the global economy and are more successful internationally. This local advantage in the host country can be promoted by corridor development, which serves as a backbone of the nexus (Musisi, 2007). The nexus cannot be delineated from such infrastructure networks as roads, ports, railways, electricity, telecommunication amongst others. It can, therefore, be said that these Infrastructure Network Plays a Vital Role in the Investment Decision of (MNE'S), therefore, corridor approach is essential for countries and regions to efficiently maximise the network benefits.

According to Srivastava (2013), corridors are used in urban and regional planning to connect large economic activity nodes and significant concentration of population. These corridors are expected to be viable and improve the productivity of the regions as well as link coastal regions to the hinterland. Hence, corridors must make economic sense by ensuring that locations or countries linked by the corridor are actual or potential hubs of economic activities enabled through the movement of information, people and goods. For instance, the Lagos- Abidjan (L-A) corridor is one of the most influential coastal corridor located in west Africa that links major economies in the region (ICA[1],2014) and this linkage ability can be through the hard physical connectivity of infrastructure network (Castels,2011; Derudder and Witlox,2008). The hard connectivity include effective mode of transportation (high quality air, road and rail) to enable timely and safe access to raw materials, goods and services by entrepreneur and enhance the efficient movement of workers to and from desired jobs; the ease and free flow of information, knowledge and technology via solid and extensive telecommunication network ; energy in the form of electricity supply free from interruptions and shortages to enable unimpeded functioning of businesses and factories (WEF, 2014., WEF, 2015).

The coastal corridor (L-A corridor) spans about 1028 km linking key economically dynamic cities in Africa (Abidjan, Accra and Lagos,) and serving as a global gateway to both coastal and countries that are landlocked in the West Africa sub-region through at least one port and several networks of transportation infrastructure, network of information and communication technology infrastructure as well as energy infrastructure which leads to scale economies along the Abidjan-Lagos corridor. The corridor also caters for approximately 35 million people in 5 countries which include Nigeria, Togo,

[1] Infrastructure Consortium for Africa

Benin, Ghana, and Côte d'Ivoire (Infrastructure Consortium for Africa, 2014 Abidjan-Lagos Corridor Organization, 2014).

Furthermore, the Improvement in the infrastructure networks in West Africa have enhanced its growth by 1% per capita per annum from 2000-2005 (Ranganathan and Foster, 2011), This positive effect can be attributed to the Information and Communication Technology (ICT) revolution whereas inadequate electricity (power) infrastructure declined the economic growth by 0.1% per capita per annum. Similarly, poor road condition also reduces intra-regional trade and investments (ICA,2014), likewise in 2014 about 10.8% of annual sales was lost in countries in this corridor as a result of power outage (World Bank, 2016). According to the Global Competitiveness Report (GCR) In 2014, inadequate infrastructure is one of the most problematic factors for doing business in the countries along the Lagos-Abidjan economic corridor and Africa in general (WEF, 2014). Therefore, the right and deliberate approach to delivering and maintaining infrastructures are required for a strong, competitive and vibrant economy; efficient transportation of finished goods and raw materials/resources; facilitation of transactions and negotiations. Additionally, according to (Ranganathan and Foster (2011), an improvement of West African infrastructure to the level of the Mauritius (the country with the best performance in infrastructure) will boost regional growth performance by 5%. This further buttress the significance of infrastructure network for attracting FDI for economic integration and emphasis should be on hard physical infrastructure with network effects such as transportation infrastructure which includes road transport, railway waterway and airports; Information and Communication Technology (ICT); and Electricity infrastructure. However, despite the relevance of infrastructure network for FDI attraction and global economic integration, Africa in general and Lagos-Abidjan corridor, in particular, lags behind other regions in infrastructure (WEF,2015) and this has the tendency to reduce its attractiveness to other forms of FDI other than the traditional resource-based FDI

According to WEF (2014), most African countries fall within the first stage of competitiveness, typically a factor-driven economy with sub-indicators such as health, institutions, macroeconomic environment, primary education and infrastructure. On the other hand, most European countries are at the innovation-driven stage, defined by business sophistication and innovations in research and development. Hence, the impact of infrastructure together with other factors is felt differently in both regions. The North-Sea Mediterranean (NSM) corridor is modern with good connectivity and accessibility of land-lock areas and is located in the European region. According to WEF (2015), the countries within the NSM corridor rank quite high out of a total of 7 in quality of infrastructure (Netherlands 6.3, Germany 6.1, France and UK 6.0) in contrast to countries within the Lagos- Abidjan (L-A) corridor in the African region, have low ranks in infrastructure pillar (Nigeria 2.1, Benin 2.3, Ghana 2.7 and Côte d'Ivoire 3.6). Additionally, according to Burger et al. (2013) geographically closely linked cities exhibit stronger competition compared with cities distance apart. This shows that poor infrastructure networks have the tendency to reduce the competitiveness as well as the flow of FDI into the L–A corridor although the corridor has great potentials in becoming modern, smart and capable of attracting FDI into countries and regions (United Nations Conference on Trade and Development, 2015)

The concern of the study is on the importance of infrastructure network as a facilitator of Global Economic Integration (GEI) in host countries of MNEs since these MNEs carry out FDI. It intends to show the relationship between infrastructure networks and the flow of FDI into countries and regions in the L-A corridor and Africa by benchmarking the North Seas-Mediterranean (NS-M) corridor and Europe. This knowledge will greatly assist in the understanding of the importance of hard connectivity in increasing the productivity and FDI attractiveness of countries.

1.2 Problem Statement

Infrastructure development is vital for achieving Africa's goal of economic integration and is essential for ECOWAS future success. In view of the global economic crisis and the ongoing diversification initiatives, infrastructure development needs to be accelerated more than ever before to enhance physical connectivity and increase in intraregional trade especially in L-A corridor and ECOWAS sub-region. The L-A corridor is located in the west African sub-region with a natural endowment of abundant land, Mineral, energy (oil and gas), and human resources (Kolawole, 2013), and serves an influential gateway to the West African region in the form of a coastal corridor linking major economies (Infrastructure Consortium for Africa,2014). According to Coulibaly and Fontagne ´ (2005) coastal

regions have great potential for attracting FDI and excelling than landlocked countries. Similarly, Alsan et al (2004) and Ndulu (2006) states that countries bounded by coastal regions in Africa tend to attracts more FDI than those in the hinterland, and this finding is in line with Gallup (1999) who posited that, countries strategically located and rich in resources outperform those in landlocked areas. In addition, increasing non-resource FDI (manufacturing, service and Hi-tech FDI) that is either market seeking (dependent on domestic market size), or efficiency seeking (dependent on lower cost of factor inputs such as reduced transport cost, stable electricity, cheap labour, and access to raw material) as shown by Dunning (2001) requires good infrastructure, and countries in the L-A corridor and ECOWAS ranked low in the Infrastructure according to Global Competitiveness Report (WEF,2014;WEF,2015).
However, despite the coastal proximity and other location advantages that improve its potential for FDI attraction and Economic Development, FDI and intraregional trade has been consistently low compared with other sub-regions as shown by Anyanwu (2012) and Kolawole (2013), especially in non-resource FDI. This may be attributed to the inadequate and poor quality of infrastructure among other factors. Furthermore, the absence of these infrastructures affect people's quality of life, reduces competitiveness and eventually threatens the existence as well as the operation of firms (Abiad, Abdul 2014).

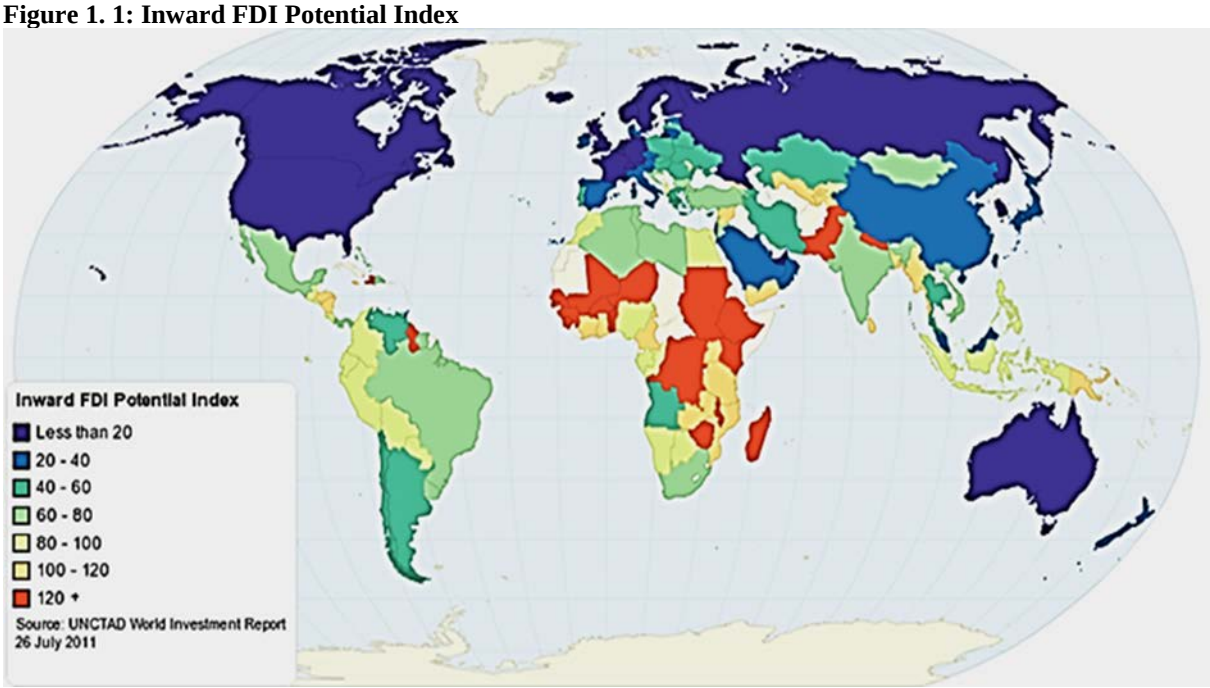
This indication of insufficient and low quality of infrastructure impedes the inflow of investment as well as hinders Economic Integration, additionally, Economides (1996. Pp.1) states that the "The modern economy would be very much diminished without the transportation, communications, information, and railroad networks" and Kolawole (2013) shows that export and trading activities decrease as distance between partner's increases. Similarly, according to Rehman et al., (2011), Poor infrastructure may result to increase in transaction cost and limits entry to both local and international markets. These may discourage MNE's from such locations, hence, reduce FDI attraction of countries. Thus, physical hard infrastructures are of great concern along the L-A corridor.

According to Kuhlmann (2011), Surface transport is expensive and very slow in West Africa compared with other regions in Africa and this can partly be attributed to poor hard infrastructure as well as to administrative bottlenecks in soft infrastructure such as border and customs clearance. Conversely, investment in physical (hard) infrastructure such as rails, roads, ports, is recognised to have the ability to improve the productivity of all factors of production and in the long run, strengthen firms and countries performance through market transaction facilitation and positive externalities (Jimenez,1994). In addition, 10% improvement in infrastructure will lead 8% improvement in export performance and increases FDI by 10.3 % (Asiedu, 2006). Therefore, to increase the FDI attraction of Africa and the L-A corridor, improvement of infrastructure network is essential. However, irrespective of the relevance of infrastructure network for FDI attraction, infrastructure in the Lagos- Abidjan corridor is in a state that impedes the inflow of FDI's and reduces its productivity. This is evident by the unavailability of real regional rail network; absence of strong regional hub for air and maritime transport; dilapidated roads as well as erratic power supply. This, in turn, leads to the high transaction, production and transportation cost, thus, increasing the price of made in Africa goods by 75% (Trebilcock,2015). This amongst others makes the expansion and provision of hard physical infrastructure critical in this region and bridging these gaps could increase Africa's annual GDP growth by 2%. (Trebilcock,2015) furthermore, Khanan (2016) emphasises that countries are moving into a future shaped by the connectivity of physical infrastructure rather than their borders. Thus improving infrastructure network measured in terms of connectivity, integration and choice (Omer and Goldblatt, 2015; Hillier and Iida, 2005) has the ability to enhance the hard connectivity of the L-A Corridor as well as the West African sub-region and this can foster Global Economic Integration through FDI attraction.

According to the United Nations Conference on Trade and Development (2014), Africa is characterised by high GDP growth rate; large market size due to the rapid growth of the middle-income class; and potentials for FDI attraction as shown by the Inward FDI Potential Index. The Inward FDI Potential Index shown in figure 1.1 below is an average normalised value of scores from zero to one with a greater value indicating countries with high potential while a lesser value indicates countries with low FDI potential. Economies are rankedfrom 0ne to above 200 based on several factors (other than market size) that are expected to affect an economy's attractiveness to foreign investors such as Gross Domestic Product (GDP) per capita, the share of exports in GDP, the share of R&D spending in GDP, Country risk, the rate of economic growth described by GDP growth amongst others.

Based on the FDI Potential Index of UNCTAD (ChartsBin statistics collector team, 2011), countries in majority of African countries are ranked below average (with an index above 60) compared with other regions of the world and in Africa, countries with coastal access have higher potential than landlocked countries. Although, most countries in the L-A corridor in West African sub-region(from Abidjan to Lagos) ranked higher than the hinterland and other sub-regions in Africa such as East Africa (where most countries ranked above 120), the potential of the corridor is however, low compared with southern and Northern African as well as on the global scale (ChartsBin statistics collector team, 2011; Sulstarova, 2007)

Figure 1. 1: Inward FDI Potential Index



Source: ChartsBin statistics collector team (2011)

Despite all these potentials, the L-A corridor and West Africa, is however, greatly challenged with slow paced development with 73% of West African states categorised by the UN as Least Developed Countries(LDC) accounting for 35% of Africa's Least Developed Countries(LDC) and the outstanding LDC region in the world (Gupta, 2015); as well as 10% decline in FDI inflow (United Nations Conference on Trade and Development,2015). This can be attributed to the poor infrastructure network.

This poor infrastructure network also hinders the linkage of cities in the Lagos–Abidjan corridor to the global value chains. At the same time, the importance of these physical infrastructure networks such as road, airport, rail, ICT and electricity is proven over time to be a significant ingredients in a modern productive economy; an important determinant of economic growth (Root and Ahmed,1979; Aschauer, 1989b; Aschauer, 1989; Gramlich,1994; The World Bank,1994); As well as a necessity for improving the climate for FDI in countries(Khadaroo and Seetanah, 2009;Kumar, 2001) through lower investment cost and high rate of return to MNE's. Additionally, the new growth theories emphasised the importance of infrastructure in the growth process of cities and countries (Musisi, 2007) and it can be said that this infrastructure networks may lead to increase in FDI. According to Aseidu (2002), "Good infrastructure increases productivity and stimulates FDI inflows". Thus, this further shows the significance of infrastructure network as a location and competitive factor for attracting Multinational Enterprise to a given location (country, region, or corridor). Additionally, World Bank estimates shows that more than half of the infrastructure projects in Africa is misplaced and not being maximised (Kuhlmann et al., 2011). This misplacement of infrastructure could be due to the placement of infrastructure in locations that are unnecessary due to inadequate knowledge of infrastructure network or as a result of political influence (as mostly experienced in Africa). Thereby making it impossible to create the network effects for economic benefits of cities along the corridor and this deters the flow of Foreign Direct Investment. Therefore, improving the hard infrastructure network together with the good macroeconomic

environment and institutional framework has the ability to unlock the continent's as well as L-A corridors untapped potentials for Economic Development and Global Integration.

This Study shows that connectivity of hard physical infrastructure influences the flow of FDI to Europe and Africa, however, the magnitude of the impact may vary. Although, not much is said about the syntactic measures of infrastructure network (connectivity, integration and choice) generated from DepthMap software using space syntax analysis and its role as a location factor for FDI attraction in developing countries and Africa in particular, this study will critically investigate its influence as a measure of cross-border infrastructure network on Foreign Direct Investment along the Lagos-Abidjan economic corridor and Africa by benchmarking Europe and NS-M corridor.

1.3 Research Objectives

The main objective of this research is to explain how infrastructure networks influence the Foreign Direct Investment inflow in Africa and along the Lagos-Abidjan economic corridor by benchmarking Europe and the North Sea-Mediterranean corridor. This can be achieved through the following specific objectives:

I. To identify infrastructure as major determinants of FDI in:
   - Africa and Europe;
   - Lagos-Abidjan Economic corridor and the North Sea-Mediterranean corridor.

II. To determine the impact of infrastructure networks on FDI inflow to the Hi-tech, Manufacturing, Resource and Service sectors in Africa

III. To make policy recommendations regarding infrastructure networks and FDI inflow in the Lagos-Abidjan Economic corridor

1.4 Provisional Research Question(s)

How does the hard physical Infrastructure network determine the inflow of Foreign Direct Investments inflow in Lagos-Abidjan Economic Corridor in Africa and the North Sea-Mediterranean corridor in Europe?

Sub-questions:

I. Does infrastructure network determine the inflow of FDI into: -
   - Africa and Europe?
   - Lagos-Abidjan Economic corridor and the North Sea – Mediterranean corridor?

II. To what extent does infrastructure network affect the flow of FDI into the Hi-tech, Manufacturing, Resource and Service sectors in Africa?

1.5 Significance of the Study

1.5.1 Scientific significance

Understanding the role of infrastructure networks in attracting FDI is highly significant to cities; urban regions; countries and the academic environment. Evidently, not so much study exist on hard physical infrastructure as a spatial network with topological dimension, using GIS and space syntax analysis, its relevance as allocation pull factor and the competitiveness of cities, regions, and countries in Africa, and their ability to attract FDI. This study provides an additional contribution to the existing body of knowledge on infrastructure networks by exploring the syntactic measures of infrastructure network such as connectivity, integration and Choice and the attractiveness of a location to MNE's for FDI, which leads to Global Economic Integration. The study also provides insight into the significance of corridor development and connectivity in host countries of MNE's.

1.5.2 Policy Significance

This study provides insight to policymakers and development partners on the significance of infrastructure in terms of Integration, connectivity and choice in increasing the competitiveness of cities. It is useful for policy recommendations on the feasibility and the successful implementation of cross-border infrastructure projects in developing countries, that can lead to network effect rather than haphazard provisioning. This study further stimulates discussion on best strategies and policies that can assist countries to overcome the challenge of infrastructure shortage. Consequently, this will lead to productivity improvement in Africa and the Lagos – Abidjan economic corridor in particular. It will also underscore the importance of infrastructure network in economic corridors as a tool for Regional

and Global Economic Integration. This will be of importance to the city and urban planners; engineers; economic geographers; Economist and investment promoters.

1.6 Scope and Limitations

The focus of this research is on the influence of infrastructure network on the inflow of FDI in Africa with emphasis on the Lagos - Abidjan economic corridor. This will be achieved by benchmarking global best practices in locations with advanced infrastructure network such as the North-sea Mediterranean corridor and Europe. The scope of the study will cover African and European regions of the world and will narrow into the Lagos-Abidjan corridor and the North - sea Mediterranean corridor.

1.6.1 Scope of the studies

Spatially, the study area consists of African and European regions with a focus on Lagos-Abidjan(L-A) corridor and North Sea-Mediterranean (NS-M) corridor. The L-A corridor spans from Lagos to Abidjan in west Africa. This corridor consists of a stretch of road that winds along the West African coast connecting five countries (Nigeria, Benin, Ghana, and Cote d'Ivoire) as shown figure 1.1 below. It accommodates about 245 million people (Togo was excluded due to lack of data). For the purpose of road edge effect and externalities of transport infrastructure, we considered all countries sharing a border with the countries in the original L-A corridor as part of the LA corridor (Burkina Faso, Chad, Gambia, Guinea, Liberia Sierra Leone). This edge effect account for the externality of the infrastructure (both positive, neutral or negative). According to Bager and Alves da Rosa, (2012), roads can cause neutral, positive and negative edge effects in any location.

Figure 1. 2:The Lagos-Abidjan Economic corridor

Source: The World Bank Group (2010)

Similarly, The North Sea Mediterranean corridor (NS-M) is a vital, multimodal transport system stretching from Glasgow, Scotland's capital Edinburgh, and from Belfast in the North to Cork in the Western part of Ireland, through Manchester London, Paris, to Marseille in the southern part of France, and extending northward and eastward through Luxembourg, Belgium and the Netherlands. The corridor connects six countries including United Kingdom, Netherlands, Belgium, France, Luxemburg and Ireland, extending to Swiss and German borders in Basel as shown in Figure 1.2 below. For the purpose of this study, all countries sharing a border with the six countries are also included in the NSM corridor and this includes Germany, Switzerland, Spain, Denmark, Luxemburg, Czech, Austria.

Figure 1. 3: The North Sea – Mediterranean corridor

Source: The European Commission (2014)

Thematic-wise the infrastructure network considered this study is the road transport infrastructure based on the following reasons:

i. Globally, the need for face to face interaction is still in great demand and can be facilitated by transportation infrastructure network which Mathivathany (2015) referred to as the "circulatory systems through which economic and social activities flow" and the road infrastructure serves as the most common means of movement within the L-A corridor and the continent at large.

ii. Africa is characterised by a peculiar geography with fragmented economies having about 40% of its countries as landlocked (Ndulu,2006) thus the transport cost for MNE's from coastal region to and hinterland is determined by the road infrastructure amongst other factors.

iii. The missing and disjointed rail network in the L-A corridor and Africa at large coupled with inadequate data for analysing other infrastructure (such as airline movements and ICT cables or call directory) spatially, makes road infrastructure suitable for the analysis.

iv. Road infrastructure network is also a visible manifestation of the interaction between world cities and a strong factor for regional and global integration.

1.6.2 Limitation of the studies

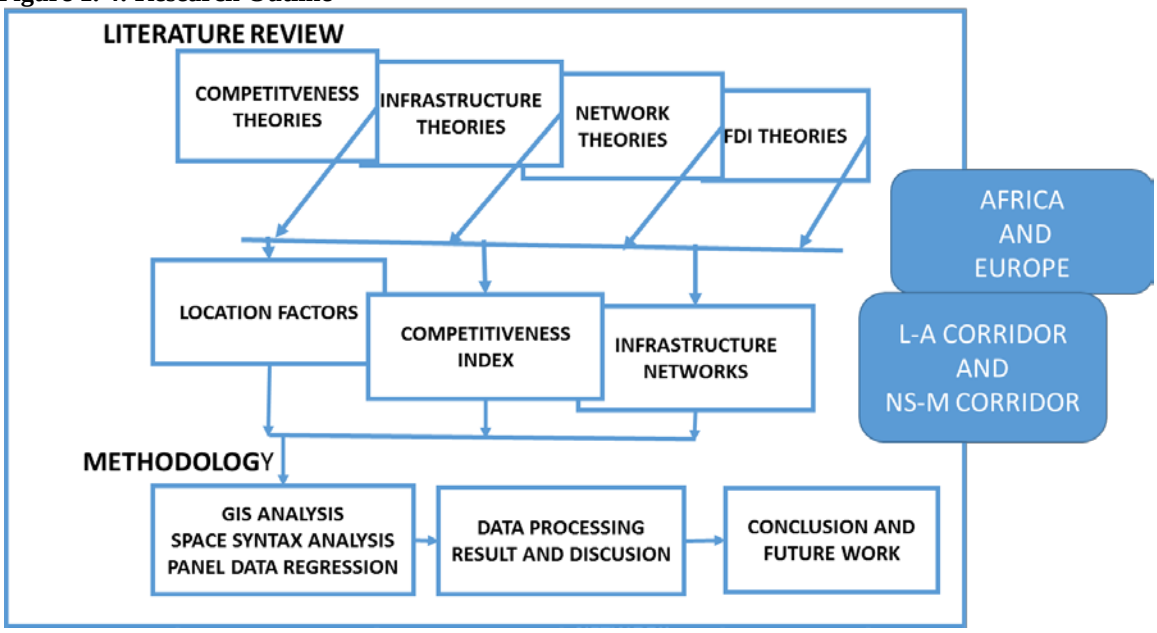
The limitations of this studies are as follows: Firstly, it would be appropriate for the study to consider other infrastructure such as electricity, railroad, ICT with network effects, however, data structure and availability does not facilitate spatial analysis. Hence, the study is limited road transport infrastructure consisting of highways and major roads. Secondly, the study will focus only on Greenfield FDI, both Total and inflow into Hitech, Manufacturing, Resources and Services sectors. Thirdly, the study will be limited to Africa and Lagos-Abidjan Economic corridor while benchmarking Europe and the North Sea Mediterranean corridor.

Fourthly, due to inaccessibility to data at the city level, the study is therefore limited to country level data from FDI market, Global Competitiveness Index and World Development Indicators (WDI) only. Lastly, the infrastructure networks of roads could not be manually digitised from an open street map to obtain the axial lines, due to the limited time of the thesis period. however, open street map data from ESRI was downloaded as shape file format and converted to an axial map in DepthMap. This may interfere slightly, with the expected result of the connectivity, integration and choice measure by generating lower values of the accessibility measures according to Xia, (2013)

1.7 Research Outline

The study progressed based on the outline shown in Figure 1.4 below. In-depth Review of theories related to Foreign Direct investment and infrastructure network was conducted, and these theories included the FDI theories, competitiveness theories, network theories and theories of space syntax. These network of theories guided the choice of variables for the infrastructure network (connectivity, integration and choice) and other independent variables that increase the competitiveness and enhances Global Economic Integration (measured by greenfield FDI inflow) of a given location as location factor using GIS, space syntax and panel data analysis as a methodology. This study was conducted within the purview of Africa while benchmarking Europe (regional level) before focusing on the specific corridor (Lagos-Abidjan while benchmarking North Sea-Mediterranean corridor).

Figure 1. 4: Research Outline



Source: Author, 2016

Chapter 2: Literature Review / Theory

2.0 Introduction

The spatial connectivity as a result of networks of infrastructure is considered within the context of Regional Economic Geography based on competitiveness, FDI and network theories. This chapter consist of Review of various literature, theories and concepts that expound and highlight the relationship between infrastructure networks and Global Economic Integration of countries (through FDI attraction) both in Africa and in Europe. In addition, this study is based on following concepts and theories: Globalisation, Global Economic Integration, Competitiveness, Productivity, Infrastructure, Foreign Direct Investment, network theories.in addition, the chapter concluded with a conceptual framework.

2.1 State of the Art of the Theories/Concepts of the Study

2.1.1 Globalization

Globalisation has become the major reason for increased competitiveness in nations and regions, through increased capital mobility and trade liberalisation (Turok, 2004). Thus this has resulted in an increase in trade and investment to cities, countries and regions across the globe. Furthermore, "Globalisation can thus be defined as the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa." Giddens (2013). Thus, these linkages can be enhanced by the quality and type of infrastructure networks.

The global flow of trade, investment, people, innovations and ideas within the last two decades was greatly facilitated by the various types of infrastructure networks. Furthermore, economies are a major driver of globalisation through reduced transportation and communication cost for Multinational Enterprise (MNE) which is made possible by the quality and quantity of infrastructure. According to Dicken (2007) "There has been a huge transformation in nature and the degree of interconnection in the World economy, especially in the speed with which such connectivity occurs". This involves both stretching and the process of intensification of economic relationships. Hence, globalisation can be seen as a stretching process, aiding interaction across distance, provided the connectivity mode between regions and social context are globally networked. This increase in connectivity can enhance globalisation and can lead to FDI inflow in these regions

Recent globalisation trend shows a sharp increase in global FDI and developing countries are more represented in the globalised economy due to trade and investment liberalisation and these have resulted in a surge in Foreign Direct Investment (FDI) inflows to developing and emerging countries (United Nations Conference on Trade and Development, 2015). Likewise, good connectivity and movement of people, resources, goods, ideas, innovations and knowledge, facilitated by infrastructure network enhance the inflow of FDI. Hence infrastructure network, linking geographic areas have proven over time to be one of the key drivers and enablers of global economic development and integration (Choi, et al., 2006).

According to Stiglitz (2007), "*economic globalisation involves the closer economic integration of various world economies through the increasing flows of goods, services, labour and capital"*. Therefore, global economic integration is a major driver of globalisation and industrialisation history, and the present global economies, have shown that infrastructure networks enabled the flow of both resources and people from one location to other through railways, sea and road transport (Choi, et al., 2006). These infrastructure networks allow concentration of population or firms in a particular location and can be easily reached by fast transportations systems (Castells, 2011).

2.1.2 Global Economic Integration

Global Economic Integration (GEI) is an existing phenomenon for many centuries and can be viewed as an argument for the free market, and greater efficiencies resulting from rapid technology transfer, specialisation, productive allocation of resources, and increased competition; as well as enhance living standards (Mussa 2001). According to Summers (1999), "the global economy is becoming increasingly integrated and that continued globalisation is beneficial to developing and industrialised countries".

Presently, GEI is greater than it previously was, and is likely to deepen as we advance. Additionally, Global Economic Integration is vital for Africa to achieve its complete growth potential, partake effectively as part of the global economy, as well as benefit from the increasingly connected global marketplace. According to African Development Bank Group (2013), the integration of African economies will create larger and attractive domestic and foreign markets; connect landlocked countries and fragile states to international communities and markets, as well as support smooth and efficient intra-African trade.

Global Economic Integration (GEI) fosters the flow of FDI through MNE's, and the FDI inflow includes Merger and Acquisition (M&A); new purchase (Greenfield); and outright purchase of existing enterprise. This interaction of economic institutions and MNE's is facilitated by transportation and other infrastructures as shown by Summers (1999). And according to Mussa (2006): "*Since the travels of Marco Polo seven centuries ago, Global Economic Integration—through trade, factor movements, and communication of economically useful knowledge and technology—has been on a generally rising trend"*. Whereas, the basic factors that guide the pace and character of this Economic Integration are likely to be its major drivers, and this may include improvement in transportation infrastructure; societal and individual preferences; as well as public policy. These may individually or collectively promote Global Economic Integration if properly harnessed.

2.1.3 Competitiveness and productivity

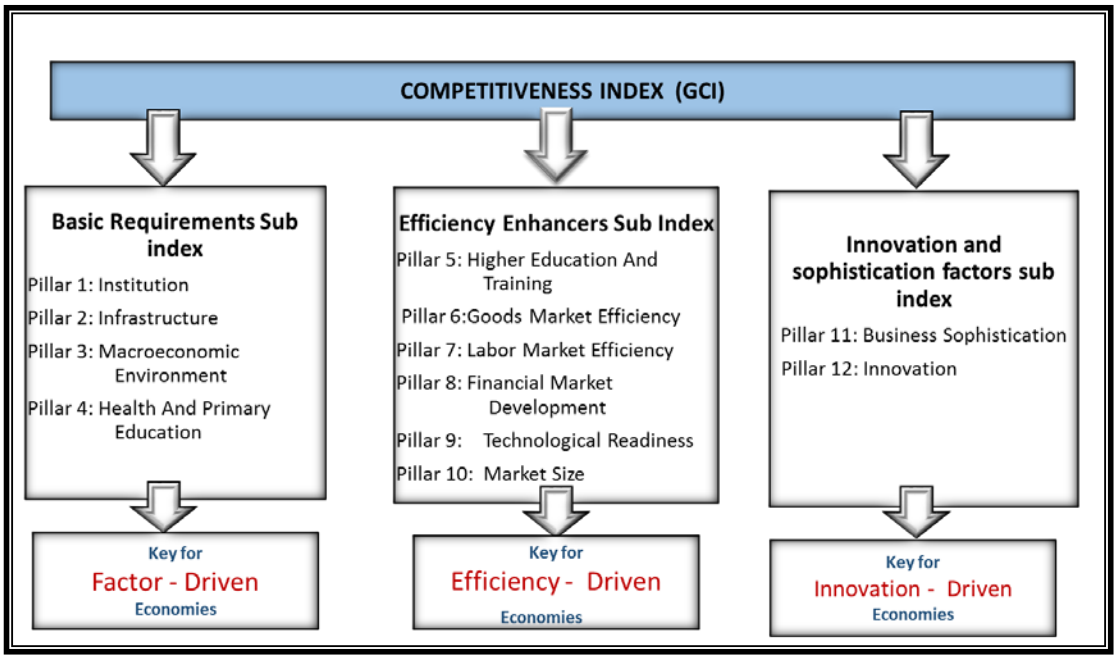
Transformation of cities, countries and regions into engines of sustainable economic growth has become the topic of global multi– stakeholder dialogues and underpinning this is productivity improvement. Hence, in the global context, urban competitiveness as a multidimensional concept includes various aspect of a city's or country's economic performance such as productivity; creativity and innovativeness; specialisation in Advance Service Delivery(ASD); and economic interconnections at various scales; and accessibility (Ranci, 2011; Burger et al., 2013). This implies that an economies' level of productivity can be defined by its competitiveness and the higher the competitiveness of an economy the more likely the productivity level increases. Additionally, the competitiveness of a city or region is considered to be a major driver of productivity (World Economic Forum 2015).

Competitiveness is not an end itself but a means to an end. It is an indication of economic performance beyond descriptive measures as income per capita and employment rates (Turok, 2004). According to Storper, (1997) "Competitiveness refers to the ability of an economy to hold stable or increasing market shares in an activity while sustaining stable or increasing standards of living for those who participate in it." Hence, attracting FDI for greater integration into the global community requires some level of competitiveness. Similarly, according to Krugman (1994), "If competitiveness has any meaning, then it is simply another way of saying productivity". Hence, competitiveness is a "function of the complex interrelationships between variables that determine the level of Economic Development such as trade (sales to external market); productivity (innovation, infrastructure and investment skills); and utilisation of location factors" Turok, (2004). The level of a countries competitiveness can, therefore, be measured using the Global Competitiveness Index(GCI) of the World Economic Forum.

2.1.4 Global Competitiveness Index

The Global Competitiveness Index (GCI) is established in Global Competitiveness Report (GCR) of the World Economic Forum and according to the World Economic Forum (2015), competitiveness is defined as "the set of institutions, policies, and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the country can earn". Indeed, productivity is one of the key factors of an economies' growth potential. Furthermore, the level of productivity sets the level of prosperity, as well as determines the ability of an economy to sustain higher income level and a higher rate of return on investment. Therefore, the GCI, classifies countries within three stages of competitiveness, firstly, the factor-driven stage; secondly, the efficiency-driven stage; and lastly the innovation-driven stage (WEF, 2014), using a combination of 114 indicators that captures certain concepts that are of great significance for productivity. These indicators are further grouped into 12 pillars based on the stage of competitiveness as shown in Figure¬2.4 below.

Figure 2. 1: Global competitiveness index



Source: Author, 2016.Source: WEF (2015)

2.1.4.1 FDI related GCI pillars

The FDI Related 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. These pillars are a set of dimensions and indicators corresponding to factors that contribute to inward Greenfield FDI in countries and are 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. Furthermore, some pillars have both catalyst and burden whereas some are considered as either a catalyst or a burden and the selection of the indicators is based on FDI theories and the P2 computation (Perez- Luque et al, 2015). 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).

First pillar: Institutions: The institutional environment depends on the efficiency and effectiveness of both public and private stakeholders. It constitutes The legal, regulatory and administrative framework within which governments, firms and individuals interact. This determines the quality of institutions and influences the investment decisions of a Multinational Enterprise (MNE's). This pillar is further subdivided into Institutional catalyst which consists of trust in politicians, transparency of Government in policy making, ethical behaviour of forms, and strength of investment and Institutional Burden which consist of the burden of Government regulation, business cost of terrorism, business cost of crime and violence.

Second pillar: Infrastructure: Efficient and extensive infrastructure are essential for the effective performance of any economy. This may include effective transportation modes such as high-quality roads, railroads, ports, and air transport. This enhances the mobility of workers and enables MNE's to get their services and goods to the market safely and in time; supply uninterrupted electricity for businesses and factories,as well as provide extensive information and telecommunications network that facilitate the free flow of information. This, in turn, increases the performance of MNE's and thus act as a catalyst for FDI inflow to countries. Additionally, the pillar is only classified as a catalyst for FDI and competitiveness and it includes the quality of roads infrastructure, quality of railroad infrastructure, quality of port infrastructure, quality of air transport infrastructure, quality of electricity supply, fixed broadband internet subscription.

Third pillar: Macroeconomic environment: A stable macroeconomic environment is vital for the effective functioning of MNE's and is important for the general competitiveness of an economy. Hence macroeconomic instability is detrimental to the economy. The pillar is further categorised as Macro-Economic Environment Catalyst which includes the Government Budget Balance, Gross National Savings and Macro-Economic Environment Burden which consist of inflation and general Government debt indicators.

Fourth pillar: Health and primary education: A healthy workforce is crucial to the competitiveness and productivity of an economy and ill health impede the performance of Workers; increase the cost of business and lower the efficiency levels of an enterprise, while attainment of basic education increases the efficiency and performance of workers. This pillar can be subdivided into Health catalyst, consisting of life expectancy indicator and Health Burden, consisting of business cost of malaria and business cost of HIV/AIDS.

Fifth pillar: Higher education and training: The quality of higher education and good training is essential for countries that want to advance from basic production. These countries are required to develop pools of highly skilled and well-educated workers with the capacity to undertake complex tasks and having a tendency to adapt to the changing global environment. This pillar is considered as a catalyst and consist of indicators such as tertiary education enrolment, quality of maths and science institution availability of management schools and availability of research and training services.

Sixth pillar: Goods market efficiency: Economies with proficient goods markets tend to be better positioned for the production of the required products and services and they ensure that these goods and services can be traded in the most effective manner in the global economy. Hence, healthy market competition is essential in market efficiency and increasing business productivity. With regards to FDI, market efficiency burden is considered and it consists of the intensity of local competition, total tax rate, the number of procedures to start a business, the number of days to start a business, the prevalence of trade barriers, trade tariffs, the business impact of rules on FDI and burden of customs procedure.

Seventh pillar: Labour market efficiency: The flexibility and efficiency of the labour market are essential for the effective utilisation of workers in the economy. It enables the movement of workers from one economic activity to another at a reduced cost allowing for changes in wage without much social interference. Additionally, labour market catalyst consists of cooperation in labour-employer relations, the flexibility of wage determination, women in labour force. These factors positively affect worker performance and enhance the attractiveness of the country.

Eighth pillar: Financial market development: sophisticated financial markets is required by economies that intend to facilitate private sector investment by providing sufficient capital from such sources as loans from banks, securities exchanges that are well regulated, and other financial products. Additionally, an efficient financial sector tends to adequately allocate resources saved both domestic and foreign population and it is considered as a catalyst for FDI attraction consisting of availability of financial services, affordability of financial services, ease of access to loan, venture capital availability.

Ninth pillar: Technological readiness: this measures the swiftness of an economy in adopting existing technologies to improve its productivity. The pillar emphasises on the capability of firms in an economy to fully leverage technology in the form of Information and Communication Technologies (ICTs) in the production processes and for day to day activities in order to increase efficiency and enhance competitive innovation. This can be facilitated by FDI as an essential source of foreign technology in the host country. This pillar is further divided into technological readiness catalyst, which consists of availability of latest technology and firm level of technology absorption and technological readiness burden consisting of FDI and technology transfer.

Tenth pillar: Market size: The size of the market in any country affects the productivity and its ability to attract FDI since large markets allow for exploitation of economies of scale by firms. With the advent of the globalisation era, domestic markets are substituted for international markets especially for smaller countries, thus overcoming the constraints of the national border. The pillar is considered as a catalyst consisting of domestic market size index and foreign market size index.

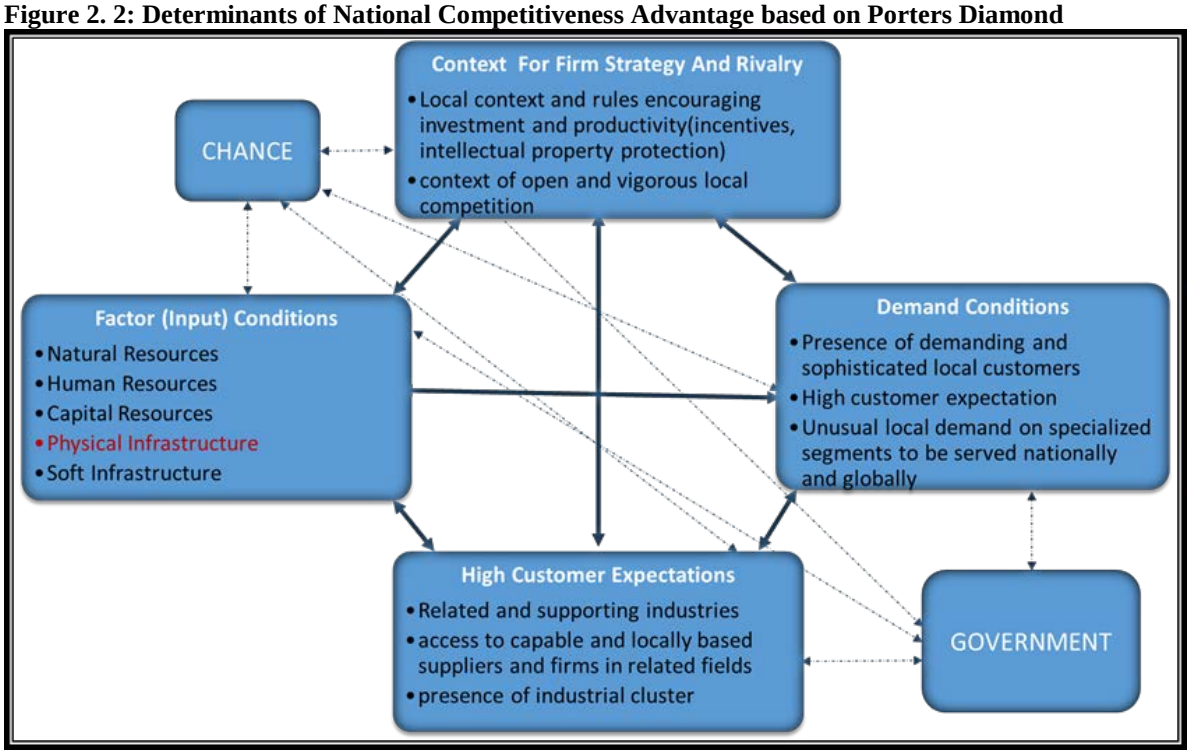
Eleventh pillar: Business sophistication: This is imperative for countries at an advanced stage of development and it measures the quality of business networks in a country as well as its supporting industries and as a catalyst for FDI attraction consisting of local supply quality, local supply quantity, and value chain breadth.

Twelfth pillar: Innovation: This is vital for knowledge-intensive economies where firms engage in the design and development of cutting-edge products and processes in order to maintain a competitive edge and advance towards greater value-added activities. It is considered as a catalyst for FDI attraction and consists of the quality of scientific research institutions, university-industry collaboration in R&D, availability of scientist and engineers and patent application.

2.1.5 National and Regional Competitiveness by Michael Porter

In the last few decades, the concept of competitive advantage has become more influential. According to Michael Porter (2000), the competitiveness of firms is measured in terms of productivity, and he conceived the processes as a 'diamond' involving four major determinants of highly interconnected systems as shown in see fig 2.1 below.

Figure 2. 2: Determinants of National Competitiveness Advantage based on Porters Diamond



Source: Author, 2016 based on Porter (2001)

Porter posits that the four factors consisting of factor (input) condition; high customer expectation; demand conditions and context for firm strategy and rivalry embedded in the model are bidirectional and interdependent including government as a supporting variable, whereas chance is the uncontrolled variable. He argued that location has a significant competitive advantage through productivity growth (Porter, 2000) and considers both Regional competitiveness and productivity as equivalent terms. Therefore, a firms' capability of utilising fewer inputs resources to produce more units of output than their competitors generate a competitive advantage. Additionally, Porter emphasised that the prosperity of a nation or region is dependent on the productivity of factors used (such as sophisticated physical infrastructure, the level of skill and knowledge (human resource) as well as capital. This is not just inherited like natural resources as a comparative advantage but rather, are created within a nation or region as a competitive advantage, and upgraded in a specific location by the government to create the required market conditions (Porter, 2000). In addition, proximity to the right type of buyers; the extent of firm's connectivity to international market; and a close working relationship with world class industries and suppliers, increases the competitiveness of firms.

2.1.6 The Theory of International Production (Eclectic Paradigm)

The paradigm is considered as the most authoritative and is widely used to ascertain the determinant of Foreign Direct Investment (FDI). According to Moosa (2016), FDI can be defined as a "process whereby residents of a country (the source) acquire ownership of assets for the purpose of controlling the production, distribution, and other activities of a firm in another country (host country)". The eclectic paradigm was formulated to provide an analytical framework that explains the various aspects and theories of FDI (Dunning, 1977). It is also an integration of three distinct FDI theories, which consist of the theory of international capital; the theory of the multinational firm; and the theory of internalisation. Buckley (1988) asserts that MNE's can overcome the market imperfections by internalising their own markets such that transaction cost is low. This can be achieved through vertical and horizontal integrations (Hennart, 2001). The theory is also regarded as the OLI theory, which posits that MNE's invest abroad to gain three types of advantages: Ownership, Location, and Internalization advantages represented as OLI (Dunning, 2001). And based on the theory different kinds of FDI are derived. They are:

I. Resource-seeking FDI
II. Market-seeking FDI
III. Efficiency-seeking FDI;
IV. Strategic asset/capabilities-seeking FDI

The OLI model is important for increasing the internal productivity of firms as well their choice of location. Therefore, improvement in the location advantage, of countries enables firms to increase their competitive advantage, and countries to attract more Foreign Direct Investment. According to Dunning, (2001) the Model can be explained as follows:

Ownership advantage: this refers to the productivity differences on the intangible asset spatially transferable from the parent company resulting to either to higher incomes or reduction in costs. This explains why firms with foreign affiliates could compete favourably with their domestic counterparts

Location advantage: this is a key factor in determining the choice of countries for the activities of the multinational Enterprise (Denisia, 2010). It refers to the "non-transferable (i.e. immobile) characteristic of any productivity differential of the host economy" Dunning (2001). The location advantages include quantity and quality of the factors of production, resource availability, availability of infrastructure that results in lower transportation, energy and telecommunication costs, large market size, and general government policies amongst others

Internalisation advantage: this is concerned with extending the direct operations, ownership and control of a firm from the home country to a host market with linkages to customers (Buckley, 1988). This also results in lowering of transaction cost within firms. More foreign production by the firm rather license and franchise results from an increase in the foreign market Internalisation benefits (Denisia, 2010). Therefore, it can be asserted that a firm supplying its own market can diversify both horizontally (laterally) into new product lines, or vertically into new activities, or through acquiring existing enterprises (Merger and Acquisition.); as well by exploiting foreign market (Greenfield Investment) in the host country (Dunning,1980; Dunning,1988; Dunning and Lundan,2008)

2.1.7 World City Networks Theories

Cities are known to be the international hub of globalisation and the World city network interprets cities as global service centres, with traditional service functions of MNE, now going global (Taylor,2004). Similarly, the concept of a network is presently becoming one of the foundational element for a better understanding of human activities and flows, investment, knowledge, innovations and ideas in the global economy. Thus, the global economy constitutes of networks of flows (Castells 1996; Yeung 1998b). This flows can be of investment, resources, goods and services, innovation as well as ideas.

Following the works of Hymer, Harvey, Friedmann, Sassen and Castells, there are fundamentally two schools in urban network study. Firstly, this includes the studies on world city network by Alderson and Beckfield (2004), using the network data of various Multinational Corporation based on Hymer's (1972) theory which posits that "the relationship between cities are linked by Multinational Corporation (MNC)". This was further buttressed through the world city hypothesis by Friedman (1986) which is

based on the work of Manuel Castells (1972) and David Harvey (1973) linking the process of urbanisation to global economic forces.
Friedman (1986) posits that certain cities have discrete roles in positioning national and regional economies into the global system and he believed that the new international division of labour and the openness of world cities determines the industrial structure and function of cities. This was further emphasised upon by Alderson and Beckfield (2004), who believe that irrespective of the industrial sectors of MNC, their network is the basic force linking cities into a world system. They employed the technique of social network analysis to measure the network structure and centrality using data from the Fortune 500 firms and their direct subsidiaries in 3692 cities worldwide in the year 2000. Thus world cities are defined by Derudder and Witlox (2008) as "command points in the organisation of the global economy, and derive their functional importance from their mutual interaction rather than with their proper hinterlands"

On the other hand, Taylor (2001) identified the world city network WCN) as an "unusual form of a network with three levels of structure: cities as the nodes, the world economy as the supra-nodal network level, and advance producer forms, forming a critical sub-nodal level'. The Global and World City (GaWC) Research Network conducted by P. J. Taylor focused on Advanced Producer Service (APS). He agreed with Sassen (1991) that the APS play a pivotal role as the frontier of economic globalisation. The research involves the analysis of 100 MNE's headquarters and their subsidiaries in accounting, finance, and other four APS sectors in 315 global cities (Taylor, 2002). He argued that "the microscopic behaviour of actors within the city can reflect the macroscopic behaviour of the city". Additionally, both studies were supported by the work of Wall & Knaap (2011), which utilised similar data to that of Alderson and Beckfield's (Fortune 100 MNCs) and classified them using the GaWC approach to into 5 levels of corporate ownership, their research serves as a link between the two schools.

2.1.7.1 Infrastructure Network as World City Network

Contemporary developments in the geographies of transportation infrastructures have a significant influence on the spatial organisation of the global economy, and network methodologies are appropriate for the providing the required framework for the analysis of the economy in terms of global commodity chains, and actor-network theories (Dicken et al., 2001). These networks (including that of transportation infrastructure) are the foundation on which the connectivity of key cities is established and is not surprising that the geography of these networks has been used to entreat spatial imagery of the WCN (Derudder and Witlox, 2008). Additionally, Storper, (1997) showed that "network of firms tied together into production systems are not only dependent on the territorial context of physical and intangible inputs, but they have greater or lesser relationship of proximity to each other. In addition, well-integrated infrastructure has the ability to provide both physical (road, rails, and ports) and non-physical (information and communication technology) connectivity between and within the firm. Hence, infrastructure network according to Bruinsma and Rietveld (1993, p. 919) "are often assumed to be important determinants of the economic potential of urban agglomerations". This explains why the most important cities harbour the significant airports, sophisticated road networks as well as the broad fibre optic backbone network infrastructure that supports the internet are deployed within and amongst major cities, thus creating a vast planetary infrastructure network upon which the global economy depend on (Derudder and Witlox,2008).

Networks have existed in the experience of humans as an ancient form of organisation, especially the transportation networks. This consist of interconnectivity of roads and highways for trade that supports the movement of people with their knowledge and ideas from one location to another. Equally important, Taaffe et al (1996) had a critical look at transportation network and its component which comprises of the linkages and flows that the network is composed of; the centres or nodes connected by the linkages; the tributary areas (hinterland) served by each node through its linkage pattern; and the hierarchy formed by the nodes of varying importance existing in the network of linkages. These components were described as follows:

1. The linkage may be the transportation facility itself such as railway, road line, waterways, and ports, or the flows over this facilities, which include number of vehicles, commodities or passengers passing through them at a particular time;

2. The nodes (Centre's) connecting the linkages in the transportation network is a representation of cities, countries or regions that are connected to each other through specific linkages. The relative importance of the nodes in terms of their relative accessibility is considered. Furthermore, some important nodes are significant in their function as gateways- serving as a major point of entry and exit for a region or country. This concept of the gateway is further expressed in terms of airline hubs and entreport for the seaport.
3. Hinterland represents an important manner in which nodes and linkages can be organised into systems, and tributary areas of port, as well as retail centres.

From history, cities and regions have existed in a well-linked environment with both information transfer and material flow, acting as Centres for connecting the hinterland to the global economy. Cities serve as the accumulated space for attracting the flow of information, capital, labour, commodity and various other economic activities in a country or region (Beaverstock, 2000). According to (Castells, 2011) information economy is attracted by communication networks, industrial economy location is determined by natural resources and power distribution network, whereas interregional trade flows and manufacturing economies are attracted by the good connectivity of transportation infrastructure networks for movement of goods, people with ideas and innovations (Rietveld, 1989).

2.1.8 Space syntax Analysis

Space syntax is grounded on accessibility and integration of topological network. It is a technique for the analysis of spatial patterns that uses both the position of structural elements and their relationship to generate some quantifiable indicators that can be used to measure global and local spatial characteristic of the structural elements. (Huang, Shu-Wei and Hsieh, Hsiu-I, 2014). The approach uses the technique of network modelling based on graph theories to estimate traffic flows and pedestrian movement potentials. This is used to measure the network parameters (Hillier, 1996). It was originally conceived by Bill Hillier and other colleagues and consist of techniques and theories for the analysis of spatial configuration. According to Jiang et al (2000) in Abubakar and Aina (2016), "space syntax offers a configurational portrayal of an urban structure as a methodology for representing the morphology of transportation networks, spaces, and building". Similarly, In the words of Hillier et al (1987, page 363): "*Space syntax ... is a set of techniques for the representation, quantification, and interpretation of spatial configuration in buildings and settlements*". These settlements can be said to be cities, countries, or regions.

The broad idea of this approach is that "spaces can be fragmented into various components, evaluated as networks of choices, then represented as maps and graphs that describe the relative connectivity and integration of those spaces" Abubakar and Aina (2016) and the three (3) most prevalent Space Syntax analysis methodology of a network analysis are Integration, Choice and connectivity.

The basic ideas regarding the calculation methods of the measure of choice and integration are based on a well-known concept of network analysis and DepthMap, known as the concept of shortest-path. This concept is defined as the minimum-length, the minimum angle and the fewest-turn. the choice and integration measures can be regarded as the common measure of closeness and betweenness centrality (Xia, 2013). Thus the closeness centrality is as defined by Sabidussi (1966) as the reciprocal of the sum of all shortest paths from a given intersection or node and betweenness centrality defined by defined by Freeman (1977) as the number of the shortest-paths containing the given node dividing the number of all the shortest paths. Similarly, according to Hillier and Iida (2005), the measure of integration (closeness) of an axial line is defined as the reciprocal of the sum of the least path from the root axial line to all others; the measure of choice (betweenness) is defined as the number of shortest paths which contain the root axial line dividing the number of all shortest paths.
The approach is used to measure the geographic accessibility of space with axial lines and the concept of Accessibility refers to *"the simplicity with which activities in the society can be reached, including needs of citizens, trade and industries, as well as public services"* (National Road Administration, 1998 page 2). This was further put into an operational form by Ingram (1971). He subdivided it into relative accessibility, defined as *"the degree to which two places (or points) on the same surface are connected"* and integral accessibility, defined as "the degree of interconnection with all other points on the same surface". Thus, the accessibility concept plays an important role in the choice of a location, especially

retailing and headquarters of MNE's. The more accessible a location the higher the economic efficiency and it depicts the ease of traversing to a destination from a given origin or location.

2.1.8.1 Infrastructure network and FDI in space syntax

The major aim of space syntax is to study the relationship between the spatial configuration of the street network and pattern of economic and social activities with respect to the concept of natural movement, movement economy process and centrality as a process (Hillier and Hansen,I984;Hillier 1999; Omer and Goldblatt,2015)). For transportation systems, space syntax can be used to expound the suitability of the overall road, rail or port network and the features of spatial structures (Huang, and Hsieh, 2014). It can also be used to discover the relationship between urban development and the various characteristics of the transport network, furthermore, there are three basic ideas in space syntax. The first involves abstracting the spaces into the connective map; secondly converting them into axial maps and lastly, analysing the axis or nodes using topology method in order to build the relevant variables. These variables include connectivity value, control value, integration value, and a depth value (Jiang and Claramunt, 2002) and are described as follows:

Connectivity value (C_i): this refers to the total number of the node (spatial unit) directly connected or linked to each individual node (spatial unit) in a connection diagram (connectivity graph). This reveals the capability of a particular spatial unit to be connected to other spatial units in the topological network. It can be stated as:

$C_i = k$ ---------- (1)

where k denotes the total number of spatial units directly linked to the particular spatial unit.

Control value ($Ctrl_i$): this indicates the degree of choice or intermediary level of an individual node for other nodes directly linked to it. It represents the potential of an axial line for through movement. This connotes how well the particular spatial unit (node) can control other spatial units (nodes) that are connected to it and it is a reflection of its control strength over others and the influence it has on any spatial unit connected to it. It is the number of times any location is encountered through the shortest distance between origin and destination (Omer and Goldblatt,2015) It can be mathematically expressed as:

Ctrl $= \sum_{j=i}^{k} 1/ci$ ---------- (2)

Depth value D: The depth value refers to the minimum number of spatial units in a specific step-distance which is linked or connected to a particular spatial unit in the connection diagram. It is a reflection of the shortest step-distance measured (not the actual measured distance) between a particular spatial unit and other spatial units. Therefore, setting d (an integer with 1 as minimum number and s as the maximum) to represent the shortest step-distance between the particular spatial unit and other spatial units, the shortest step distance number given as N_d and the depth value Di can be mathematically expressed as:

$D = \sum_{d=1}^{s} d * Nd$ ---------- (3)

The condition set is 1< d< s.

When d =1 then = connectivity
When d = h, then =Local depth
When d = s then = global depth

The mean depth Di is mathematically expressed as:

$\dot{D}_i = \sum_{d=1}^{s}(d * Nd)$/n-1 ---------- (4)

Where n = number of nodes to be studied

Integration value RA_i/RRA_i: this measures the degree of centralization or dispersion between a particular spatial unit and other spatial units in the connection diagram.

It can be expressed by Real Asymmetry (RA) and Relative Asymmetry (RRA) and can be classified as both local and global integration. It is mathematically represented as follows:

$RA_i = 2(\dot{D}-1)/n-1$ ---------- (5)
$RRA_i = RA_i / \dot{D}_n$ ---------- (6)
Where n = total number of axial lines or nodes, D = mean depth value

2.1.8.2 Types of Urban Networks

Different urban networks exist and this shapes the national and regional urban space. In the work of Camagni (1993) urban networks are divided into two groups. The First network is related to inter-city infrastructure system such as highway, railway, drainage network, etc. whereas the second group of the network is concerned with economic interactions between cities, countries and regions. This may take the form of interaction between the branches and the headquarters of MNEs, or migration of people. In the same manner, the urban network was classified in two dimensions by Smith (1995) comprising of the form of flows, defined by the flow of material, information and humans as well as the function of the flows, defined by social, economic, cultural and political flows. Similarly, according to Malecki (2002), there are two types of city network. On one hand is the soft network, which involves communication and assemblage of knowledge. On the other hand, the hard network, which entails the network of infrastructure such as the transportation network.

2.2 Review of Relevant Literatures

2.2.1 Foreign Direct Investment

Cross-border investments, by Multinational Enterprises (MNE's) and firms, remains one of the most important features of globalisation drive and urban competitiveness. Hence, MNE's engage in FDI in any country (Navaretti and Venables (2004). The International Monetary Fund defines foreign direct investment (FDI), as "an investment made to acquire lasting or long-term interest in enterprises operating outside of the economy of the investor" and the threshold of equity ownership should be ten percent (10%) (International Monetary Fund, 1993), and FDI involves investments in a distant location by an investor in a firm located elsewhere other than that in where the investor is based (Wall et al., 2011).

Globally the inflow of FDI declined by 16 percent in 2014, and this may be attributed to increased geopolitical risks, the uncertainty of policies, as well as the fragile nature of the global economy (United Nations Conference on Trade and Development, 2015). However, the experience in developing countries differ. FDI increase by 2 percent (2%) in developing countries and Africa accounts for 4.4% of this increase, resulting in an increase from the 3.7% in 2013. It is also obvious that the percentage of sub-Saharan Africa to global FDI inflow increased by 5% in the same year (United Nations Conference on Trade and Development, 2015).

2.2.1.1 Foreign Direct Investment in Africa

In Africa, FDI trends may have been shaped by some important factors such as the increase in intra-African FDI; involvement of non-traditional actors (private equity) as well as emerging-market firms (Asia), and expanding consumer markets due to growing middle class. The flow of FDI into Africa by the traditional investors still constitute a significant proportion with the European union (consisting of France (USD 21 billion), Greece (USD 10 billion specifically to Egypt), the United Kingdom (USD 6.9 billion) and Belgium (USD 5.2 billion)) accounting for 41% of FDI and 37% of jobs created by greenfield FDI (308 000 jobs) between 2009 to 2014 (UNCTAD[2], 2014. However, the single major investor in value terms of greenfield FDI to Africa during the year under review was the United Arab Emirates (USD 45.6 billion). Furthermore, with declining share of FDI from OECD countries, due to net divestment of MNE's from developed economies like France, United Kingdom with the USA having higher level of net divestment in 2014, emerging economies such as India and china are becoming an important source of greenfield FDI in African countries (FDI Intelligence, 2014).

The increasing investment by emerging economies accounts for 3% to 6% of FDI from 2009 to 2014 and china singularly created approximately 48,000 jobs and invested approximately $11.7 billion (FDI Intelligence, 2014) in addition, Africa attracted 156 more FDI projects than countries in the Middle East in 2015 with South Africa as the top destination in African for inward FDI by project numbers (FDI

[2] United Nations Conference on Trade and Development

intelligence ,2016). This investment is majorly in oil and gas producing countries of Western Africa, agricultural products, transport, light manufacturing, construction and clothing & shoes (Broadman, 2007; UNCTAD, 2014). These dynamics can be attributed to the increase in openness of African economies and trade liberalisation. However, West Africa sub- region experienced a decline of 10 percent ($12.8 billion), and this could be attributed to declining commodity prices, an outbreak of Ebola, and regional conflicts (UNCTAD, 2014).

2.2.1.2 Foreign Direct Investment in Europe

FDI according to United Nations Conference on Trade and Development (2009) can be termed as "an investment made by a resident of one economy in another economy, and it is of a long-term nature or of "lasting interest." FDI into Europe by a number of projects is mainly knowledge intensive industries majorly hi-tech consisting of business and financial services, services sector comprising of transportation, warehousing and storage and manufacturing sector consisting of Engines, turbines and industrial machinery as well as other (FDI Intelligence, 2013).

According to FDI Intelligence (2014), FDI into Europe declined by 12.08% in 2013, amounting to $137.26bn resulting in the 6% decline in a number of projects totalling 4166 with the United Kingdom as the leading destination for FDI in the European region. Thus, the greenfield FDI in the UK amounted to 796 projects with a total value of $26.51bn accounting for almost 20% of Europe's FDI. Additionally, in 2015, greenfield FDI showed evidence of recovery globally, with an increase in capital investment of about 9%, and 1% increase in jobs creation. However, based on FDI intelligence (2016), FDI inflow into Europe by the number of projects, declined by nearly 9% in 2015. Despite this decline of FDI projects, capital investment from the Europe increased 7%. Some of the factors that influence the flow of inward FDI to Europe, especially Western Europe include Macroeconomic Indicators such as GDP growth, Economic Freedom, low unemployment and inflation rates; and membership of the European union and the Organization for Economic Cooperation and Development (OECD) Kornecki (2011).

2.2.1.3 FDI by Sectors

According to the FDI market of the Financial times in FDI intelligence (2015), there is basically four sectors (general aggregate) and it includes Hi-tech, manufacturing, services, and resources which are further classified by industry activity and industry sector as shown below:

Hitech sector general aggregate consist of industry sector which includes: automotive OEM, medical devices, pharmaceuticals, chemicals, business services, space & defence, aerospace, semiconductors, biotechnology, engines & turbines and the sector activity ranges from manufacturing, maintenance & servicing, sales, marketing & support, retail, business services, design, development & testing, research & development.

Manufacturing sector general aggregate consist of industry sector which includes: beverages, textiles, industrial machinery, equipment & tools, plastics, electronic components, consumer products, metals, building & construction materials, ceramics & glass, real estate, non-automotive transport OEM, food & tobacco, communications and the industry activity ranges from, manufacturing, retail, maintenance & servicing, sales, marketing & support, construction. Furthermore, in the past few decades, there has been a gradual shift from the manufacturing sector FDI inflow towards the services sector FDI, especially in developed and emerging economies (Kornecki,2011).

Services sector general aggregate consist of industry sector which includes: Communications, Business Services, Software & IT services, Transportation, Financial Services, Hotels & Tourism, Warehousing & Storage, Real Estate, Leisure & Entertainment, Healthcare and the industry activity ranges from Headquarters, Manufacturing, Research & Development, Education & Training, Sales, Marketing & Support, Business Services, Sales, Marketing & Support, Logistics, Distribution & Transportation, Business Services, Construction, Retail, Headquarters. According to Enderwick (2013), the service industry accounts for an increasing proportion of employment and national income in advanced and emerging economies and MNE's in retailing and tourism concentrate on a segment of the market with

high quality. Furthermore, an inflow of service FDI has the tendency to stimulate growth in service industries globally (Doytch and Uctum, 2011).

Resources sector general aggregate consist of industry sector which includes: Coal, Oil and Natural Gas, Transportation, Food & Tobacco, Alternative/Renewable energy, Metals, Minerals, and the industry activity ranges from Electricity, Logistics, Distribution & Transportation, Manufacturing, Sales, Marketing & Support, Extraction, Business Services, Headquarters

2.2.2 Infrastructure

Infrastructure plays a vital role in the economic development of countries and the availability and quality of hard physical infrastructure are significant for economic growth. Consequently, a well-developed infrastructure has the tendency to reduce distance between cities, countries or regions by integrating and linking directly or indirectly to markets, knowledge, technology and innovation in other cities, countries and regions at low cost (WEF,2014)

Infrastructure is referred to as the foundation of a stable, functional and productive society and different authors based on the context, use different terms to refer to infrastructure interchangeably. They include: social capital, this refers to provision of services, without which production activities or services will not occur (Hirschman, 1958); non-military capital, this refers to capital expenditure that excludes all military spending (Aschauer, 1989b); and public capital stocks which includes inputs in production process of firms that independently contribute to output such as highways, bridges, and power stations(Duffy-Deno and Eberts, 1991). Furthermore, some infrastructures are referred to as critical infrastructure and are defined by Eusgeld et al., (2009) as the "network of independent, large-scale, man-made systems that function collaboratively and synergistically to produce a continuous flow of essential goods and services"

Infrastructure according to this study refers to as a hard physical road transportation network that functions to produce the quantity and quality of goods and services that are accessible; connect economic agents, and determine the location of MNE's. In addition, this network has the ability to improve the level of productivity and the quality of life of its citizenry. According to Aschauer (1989a), public investment in infrastructure is productive and new (Greenfield) investment in infrastructure is more productive than increasing labour and capital. Furthermore, a decline of public infrastructure growth can reduce the productivity of labour whereas improving infrastructure investment could lead to about 2.1% (percent) annual growth in labour productivity (Munnell, 1990)

2.2.2.1 Transport infrastructure:

The connectivity of transportation infrastructure plays an important role in the spatial structure of cities. Thus network connectivity is highly significant for improving the efficiency of flexible transport services.

Road infrastructure network is regarded as the life-blood of the human civilisation and the most significant manifestations of economic, social as well as commercial advancement of any region and the prosperity of the economy and social interactions in space have been fashioned by both intra-regional and inter-regional networks of the road (Sarkar, D. 2013). According to Dicken, (2007) "Transportation infrastructure serves as the circulation processes connecting together the various components of the production network of Multinational Enterprise". These infrastructures can be seen as a channel for the flow of social and economic activities (Elshahawany et al., 2015). Thus, the mutual relationship that exists between the provision of transportation infrastructure networks and regional development is of great concern to urban planners.

Transport infrastructure can be described to as a complex system consisting of several non-linear and unpredictable elements that produce a positive feedback (Cascetta, 2013). Hence, improvement in the quality and quantity transport infrastructure has the ability to influence both productions, household consumption, and reduce transportation costs as well as increase transportation volumes (Rietveld, 1989). Thereby, creating a substantial redistributive effect among regions. According to (Dicken, 2007), This will directly or indirectly influence the cost of production of goods and services. Evidently, a strong positive linkage exists between a network of sophisticated transportation infrastructure and regional development (Rietveld, 1989). Thus, reduced transportation cost is a strong attraction for both domestic and foreign MNE's especially in extractive and manufacturing industries and can lead to huge

inflow of trade and investment to the region and the dividend of this influx will result in regional economic development

2.2.2.2 Infrastructure in Africa

In developing economies and emerging market, there exist an obvious gap both in quantity and quality of infrastructure per capita. Hence, in Africa, infrastructure investment accounts for only 4% of its GDP as against 15% investment in china (African Development Bank Group, 2013) and to bridge this gap, investment in African infrastructure must be up to 15 percent of its annual GDP and this could consequently lead to about two percentages (2%) increase in the annual GDP growth of Africa (Trebilcock, Michael 2015). Therefore, more infrastructure investment is required and corridor approach is a good strategy due to the huge financial implication of infrastructure provision and the inability of smaller, poor and landlocked countries to meet up with the demand.

Africa is confronted with several overwhelming challenges and amongst them is infrastructural challenges. Inadequate infrastructure in any country is identified as a major constraint to the economic development of cities and the inadequacies in both quality and quantity can be as a result of several factors amongst which are low investment level by both public and private sectors. Hence investment in infrastructure has the capacity to attract more FDI in infrastructure as well as FDI to other sectors (Root and Ahmed, 1979). Consequently, this can lead to improved productivity (Jimenez,1994), hence, increasing the ability for countries and region to compete in the global economy.

Although Infrastructure is known to contribute significantly to economic growth, and its potential for future contribution can never be overstated, infrastructure network in Africa lags behind those of other developing countries and developed countries. Prominent amongst them is the missing regional links resulting from infrastructure connectivity (Foster and Briceño-Garmendia, 2010) and this regional infrastructure development is challenged by the peculiar economic geography of Africa amongst other factors, making Africa's infrastructure services more expensive compared with other continents. This is exhibited in the dis-economies of scale leading to increasing per unit cost of production of goods and services.

2.2.3 Infrastructure Network and Productivity

Infrastructure endowment is also an important factor in national or regional competitiveness and is targeted at productivity improvement of cities, countries, and regions. This can further lead to improved quality of life of its citizenry. According to the (WEF, 2015) in the Global Competitiveness Report of the World Economic Forum, "Extensive and efficient infrastructure is critical for ensuring the effective functioning of the economy". Correspondingly, Modern foreign investors are not only interested in raw materials but in advanced products, good infrastructure networks as well as educated and urbanised labour force, (Hymer, 1970). Hence, the importance of physical infrastructure networks such as such as road, airport, rail, is proven over time through various literature to be a significant ingredient in a modern productive economy. They are considered as an important determinant of economic growth (Root and Ahmed,1979; Aschauer, 1989b; Aschauer, 1989; Gramlich,1994; The World Bank,1994); As well as a necessity for improving the climate for FDI in countries (Khadaroo and Seetanah, 2009; Kumar, 2001) through lower investment cost and high rate of return to MNE's

There exist several conclusions based on research regarding the relationship between infrastructure investment and regional or national economic growth. Root and Ahmed (1979) asserted that infrastructure plays a critical role in non-extractive FDI, and their work shows that low level of infrastructure networks, coupled with the instability of government, low income and economic growth can be a major constraint to attracting other forms of foreign direct investment than extractive in developing countries. Additionally, Garcia-Mil and McGuire, (1992) posited that in addition to labour and private capital in the regional production function, public inputs (infrastructure) in the form of highway and others have significant positive effect on output. This, however, makes public infrastructure a necessary element of productivity growth and FDI attraction.

2.2.4 Infrastructure and Foreign Direct Investment

Emphasising the availability and quality of infrastructure as an important factor for achieving global and regional economic integration through GDI inflow is vital for both developing and developed

countries. This can be expressed through the provision of national, regional and trans-border infrastructure for economic development and well-being of the citizenry with a focus on affordability and equitable access for all (United Nations, 2015). Hence, the positive impact of infrastructure availability highlights the importance of the interactions necessary for the provision of infrastructure in the host nation and investment inflows in the developing countries (Shah, 2014). Physical infrastructure also influences the pattern of inward FDI into countries. Since the quality of infrastructure is an important determinant for the location of Multinational Enterprise (MNEs) especially efficiency seeking (Kumar, 2001). Similarly, Khadaroo and Seetanah (2009) analysed the role of infrastructure availability in determining the attractiveness of Foreign Direct Investment (FDI) inflow with respect to transportation. The analysis was done using dynamic and panel data approach from 33 African countries and found that transportation contributes the relative attractiveness of the countries. Similarly, Escribano and Guasch, (2005), also found out in their study using short unbalanced panel data of three countries for a period of 2001 to 2002 that infrastructure is significant for productivity improvement and FDI. The study showed that about 30% of the productivity was accounted for by infrastructure and red tape.

2.2.5 Corridor Development and Regional Connectivity

Corridors in urban and regional planning are used to connect large economic activity nodes, moving through or between urban areas with mixed land uses, and significant concentration of population (Srivastava, 2013). These corridors are expected to be viable and improve the productivity of the regions and the quality of life of citizens. Hence, corridors must make economic sense by ensuring that nodes linked by the corridor are actual or potential hubs of economic activities. Since economic activities are enabled through the movement of information, people and goods, facilitated by infrastructure endowment, then it is obvious that there exists a strong relation between infrastructure and economic development (Elshahawany et al., 2015). This relationship is enhanced by the corridor approach.

Economic corridors are critical for emerging economies and the main aim of the economic corridor is not only for establishing a strong efficient trade, investment and transport linkages for commercial purpose but also for attaining sustainable development at regional scales (Kuhlmann, et al., 2011). Although, corridor development result in a strong economy, most importantly it focuses and amplifies the economic growth potential (Srivastava, 2013) and the approach mostly has as its central spatial focus the transport corridors for regional development and cooperation projects". Thus, transportation networks can be referred to as the "circulatory systems through which economic and social activities flow" (Mathivathany, 2015). However, it is being asserted that Landlocked countries with limited or no natural resources remain more closed economies; struggle with trade integration; and exports accounts for only about 10 percent of their GDP (International Monetary Fund, 2015 Alsan et al.,2004; Ndulu,2006). Additionally, these economies landlocked countries are also largely affected by lack or inadequate infrastructures such as transportation network infrastructures.

2.2.6 Lagos-Abidjan Corridor

The Abidjan - Lagos Corridor is a part of the Dakar-Lagos Corridor, which in turn is a part of the greater Trans-African Highway Network located in the ECOWAS region, and Programme for Infrastructure Development in Africa (PIDA) undertakes major aspect of the development. African Development Fund (2016). The corridor traverses all major economic centres of the Member Countries extending from Abidjan to Lagos.

According to Infrastructure Consortium for Africa (2014), the Lagos-Abidjan coastal corridor is recognized as a highly prioritized corridor for socio – economic development in the West African sub-region and the coastal corridor covers a span of about 1028 km linking densely populated and key economically dynamic cities in Africa (Abidjan, Accra and Lagos,) and serving as a global gateway to both coastal and countries that are landlocked in the West Africa sub-region through at least one port and several networks of transportation infrastructure, network of information and communication technology infrastructure as well as energy infrastructure. Presently, in the sub-region, the corridor supports approximately 75% of the trade and economic activities and is regarded as the backbone for multi-modal trade logistics. This leads to economies of scale along the Abidjan-Lagos corridor which caters for approximately 35 million people in 5 countries (Nigeria, Togo, Benin, Ghana, and Côte d'Ivoire). The main objective of the corridor is to reduce both trade and transport impediments within

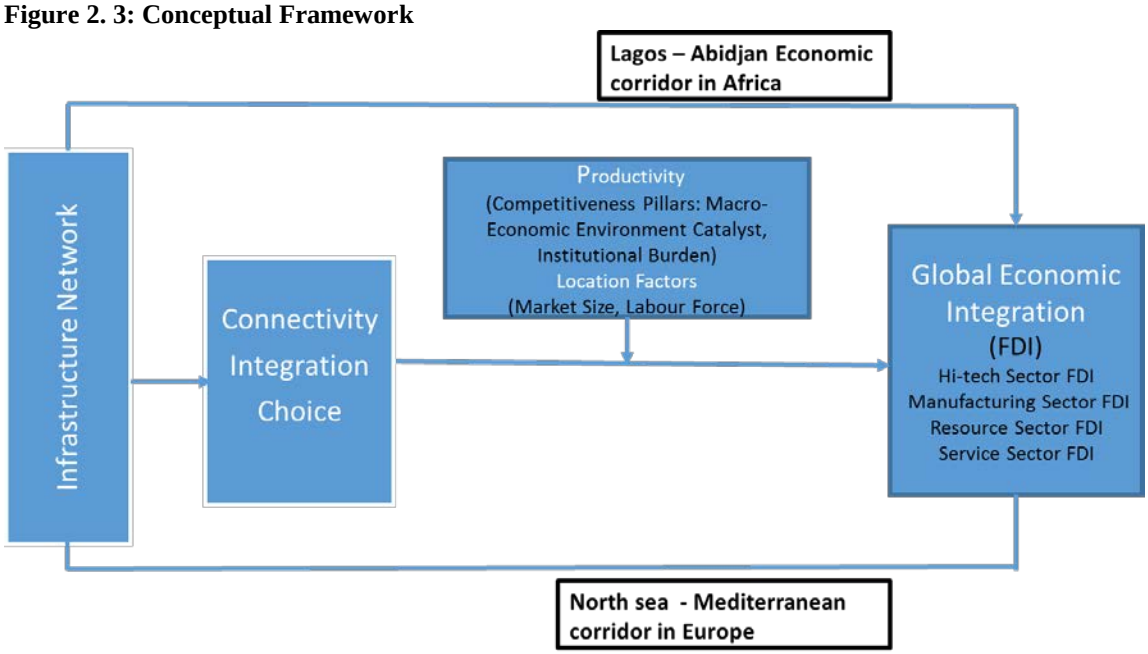
the ports located along the Abidjan-Lagos highway (Infrastructure Consortium for Africa, 2009). This can be achieved by transforming the corridor into an effective and efficient trade and investment corridor. Additionally, In West Africa and the L-A corridor the inflow of FDI inflows declined by 14 percent in 2013 and is largely due to decreasing in inflows to Nigeria, however, as a result of the recent oil production in Ghana, Gabon and Côte d'Ivoire it attracted considerable investment from foreign MNE's (United Nations Conference on Trade and Development,2014)

2.2.7 North Sea-Mediterranean Corridor

The North Sea Mediterranean corridor (NS-M) is a vital, multimodal transport system stretching from Glasgow, Scotland's capital Edinburgh, and from Belfast in the North to Cork in the Western part of Ireland, through Manchester London, Paris, to Marseille in the south, and extending northward and eastward through Luxembourg, Belgium and the Netherlands furthermore, the corridor connects six countries including United Kingdom, Netherlands, Belgium, France, Luxemburg and Ireland, extending to Swiss and German borders in Basel (TENtec Reporting, 2014). Additionally, in the European region and the NS-M corridor, countries with the good connection of transportation networks perform better in terms of trade and investment (Lafourcade and Paluzie,2011).

2.3 Conceptual Framework

Figure 2. 3: Conceptual Framework



Source: Author, 2016

The conceptual framework is based on the OLI theory (Eclectic Paradigm), which posits that MNE's invest abroad to gain three types of advantages: Ownership, Location, and Internalization (Dunning, 1993; Dunning, 2001); and the network theories (Castells 1996; Hillier,2009; Hillier 1987) to estimate human activities and flows of investment, knowledge, innovations and ideas in the global economy. The framework focuses on the location advantage of the OLI theory and motivations for MNE's investment decision and these MNE's carry out FDI into various sectors of the host country's economy and these sectors include Manufacturing sector, Hitech sector, Service sector, and Resource sectors respectively. Hence, Infrastructure network amongst other factors, is important for the investment decision of MNE's in a host country.

The connectivity, choice and integration measures of Infrastructure network are obtained based on network theories (Hillier et al.,2009) using GIS and space syntax analysis. These measures of infrastructure network are considered as an important determinant of Global Economic Integration (GEI) measured as the inflow of greenfield FDI. In addition, Porter (2000) posits that a location has a significant competitive advantage through productivity growth. This growth is determined by its level of competitiveness. Hence, location factors such as market size and labour force as well as competitiveness factors such as Macroeconomic Environment consisting of Govt. budget balance, gross

national savings and institutions (burden) consisting of burden of government regulation; burden cost of terrorism; business cost of crime and violence determine the impact of infrastructure network on FDI. The framework shows that measures of infrastructure network (road transportation) and other control variables based on Network and FDI theories (Dunning, 2001; Porter,2000;Castells 1996;Hillier et al,1987;) can influence Global Economic Integration through the inflow of FDI in in L-A corridor and Africa as well as NS-M corridor and Europe.

Chapter 3: Research Design and Methods

3.0 Introduction to Chapter 3

This research investigates seeks to find the relationship between infrastructure networks and greenfield FDI inflow in Africa and Europe and the LA corridor as well as the NSM corridor. It also seeks to determine the extent to which this infrastructure network influence the flow of FDI into Hi-tech, Manufacturing, resources and service sectors in Africa. This chapter specifically describes the revised research question, the research strategy (approach), the research methods and techniques, the operationalization of variables, sub-variables and indicators, selection of sample size, types of data, data collection and analysis methods as well as the validity and reliability.

3.1 Revised Research Question(s)

How does the hard physical Infrastructure network determine the inflow of Foreign Direct Investments inflow in Lagos-Abidjan Corridor in Africa and the North Sea – Mediterranean corridor in Europe?
Sub-questions:

I. Does infrastructure network determine the inflow of FDI into:
    a. Africa and Europe;
    b. Lagos-Abidjan Economic corridor and the North Sea-Mediterranean corridor?

II. To what extent does infrastructure network affect the flow of FDI into the Hi-tech, manufacturing, resource and service sectors in Africa.

3.2 Operationalization: Variables, Indicators

The scope of analysis is the L-A economic corridor in Africa while benchmarking the NS-M corridor in Europe. The study proceeded from the regional analysis (Europe and Africa) to corridor level (NS-M Corridor and the L-A corridor). The dependent variable is Global Economic Integration (GEI) measured as total and sector wise Greenfield FDI inflow (volume). The data is obtained from the FDI Markets which is a professional online database of the Financial Time Limited. The independent or predictor variables are measures of road transport infrastructure network generated from space syntax analysis in DepthMap software and the other control variables are obtained from the Global Competitiveness Reports (GCI/GCR) of the World Economic Forum and World Development Indicators of the World Bank

Table 3. 1: Definition of Concepts

S/No	Concept	Definition	Sources
1	Infrastructure	Refers to hard physical network of highways and major roads that facilitate the flows of services, goods, innovations, information and knowledge by improving accessibility; connecting economic agents; increase productivity, and determining the location of MNE's	(Eusgeld, et al., 2009; WEF, 2015, Rietveld, 1989; Jiang, et al.,1999 Easley and Kleinberg, 2010)
2	Global Economic Integration	Global economic integration fosters the flow of FDI through MNE's. it refers to the Capacity of a country to attract FDI	(Mussa,2006)
3	Productivity	Productivity level can be defined by a cities competitiveness and it refers to interrelated factors that determine the location of MNE's and performance of an economy	(Porter, 2000; Piet ,1989) (WEF, 2015)
4	Location Factors	Refers to factors that determine the choice of countries for the activities of the Multinational Enterprise (FDI)	(Denisia, 2010; Dunning ,2001)

Table 3. 2: Operationalization of Dependent variable (Y)

S/No	Concepts	Variables	Sub variable	Indicators	Scale	Source
1	Global Economic Integration	FDI	Greenfield FDI inflow	Total Greenfield FDI (Volume) FDI (Hitech Sector) FDI (manufacturing sector FDI (Service Sector) FDI (Resource Sector)	Ratio	FDI market

Table 3. 3: Operationalization of independent Variables(X): Infrastructure Network

S/No	Concepts	Variables	Sub variable	Indicators	Scale	Source
1	Infrastructure Network	Road Network Measures	Integration	-Measure of syntactic integration (closeness or accessibility	Ratio	authors calculations and measurement using GIS Spatial Analysis and space syntax analysis in DepthMap software
			Choice	- Measure of syntactic choice(control) or mathematical betweenness	Ratio	
			Connectivity	-Measure of connectivity	Ratio	

Table 3.4: Operationalization of independent Variables(X): Control

S/No	Concepts	Variables	Sub variable	Indicators	Scale	Source
1	Location Factor	Market size	-Gross Domestic Product	The sum of gross value added by all resident's producers (US$).	Ratio	World bank
		Labour Force	-Total Population	Count of all residents	Ratio	World bank
2	Productivity	Competitiveness Index	Institutional Burden	Burden of government regulation; Burden cost of terrorism; Business cost of crime and violence	Ratio	GCI/GCR
			Macroeconomic Environment catalyst	Govt. budget balance Gross national savings	Ratio	GCI/GCR

3.3 Research Strategy and Method

The research strategy is a combination of existing secondary quantitative strategy (empirical desk research) and primary quantitative approach of generating new variables. There are primarily three categories of research methods: spatial analysis, space syntax analysis and quantitative analysis.

The choice of this strategy based on the broad geographical scope of the study which explains the relationship of infrastructure network and FDI from a large sample size (African and European countries and cases of Lagos – Abidjan and North Sea Mediterranean corridor) and the two corridors are among the most heavily travelled coastal corridors linking some of the busiest ports in Europe (from Rotterdam

and Amsterdam in Netherlands, Antwerp in Belgium, to Marseilles in France) and in Africa, from port of Lagos to port of Abidjan in Côte d'Ivoire as well as the adjoining hinterland (Jere, 2015; European Commission, 2013; Infrastructure Consortium for Africa, 2009). These corridors link a mixture of mega, large, medium, and small cities aiding economic activities.

The choice of the two corridors was based on deviant case purposive selection of cases (Thiel, Sandra van 2014). This represents extremes examples (cases) of contrasting phenomenon of interest (infrastructure networks and Greenfield FDI) with the European corridor as a modern corridor with countries ranking high in infrastructure index of the GCR. Netherland has an index of 6.3, Germany 6.1, France and UK 6.0 with good connectivity and accessibility to landlocked areas while the African corridor has a poor quality of infrastructure with low ranks. Conversely, the connectivity and accessibility of most of the countries in the L-A corridor in Africa is below average with Nigeria having an infrastructure index of 2.1, Ghana 2.7, Côte d'Ivoire, 3.6 Benin 2.3 respectively (World Economic Forum, 2015), although it has great potentials in becoming a modern (smart) corridor (United Nations Conference on Trade and Development, 2015).

3.4 Data Collection Methods

The study employed the use of both quantitative and qualitative data through various methods. For the secondary quantitative data, a convenience non-probability sampling was used due to the availability of data The obtained data was cleaned and missing data were addressed through multiple imputations and blank entries.

The primary data was generated in two ways. Firstly, it involves the database creation of significant infrastructure network measure of connectivity, Integration and Choice along the L-A and the NS-M corridor and was done by vector data extraction of the feature through buffering and clipping of infrastructure network data using the country shapefiles and analysing the network in UCL DepthMap software for the space syntax analysis. This will show how investment patterns in cities are shaped by networks of various infrastructures.

3.4.1 Data Collection Instrument

The study employed the use the of the diverse instrument for collection of both primary and secondary data.

3.4.1.1 The Secondary Data

The secondary data was collected from various existing secondary data sources. The instruments used were reports, index, and indicators from renown and validated sources as explained below:

3.4.1.1.1 The Dependent variable

Global Economic Integration: this is measured by the inflow of Greenfield FDI The data is obtained from the FDI Markets which is an invaluable professional online database of the Financial Time Limited that provides an in-depth cross-border greenfield investment monitor. It consists of a very comprehensive online database covering all countries and sectors worldwide. It is efficient in providing access to real time investment projects, capital investments, location profile and the amount of employment created by the companies. It contains data on investment from source company, location, city country, value and count as well as a destination country, city and location. This provides accurate data on the flow of investment to cities across the globe

3.4.1.1.2 The independent Variable

Infrastructure network: the analysis used primary data on infrastructure network generated from UCL DepthMapX software using space syntax analysis. The focus was limited to road infrastructure network. The choice of road transport infrastructure was guided by the demand for face to face interaction globally, facilitated by transportation infrastructure amongst which is road infrastructure, and Road infrastructure network is also a visible manifestation of the interaction between world cities and a strong factor for regional and global integration.

In Africa, with peculiar geography, fragmented economies and having about 40% of its countries as landlocked (Ndulu,2006), most common means of movement within the L-A corridor and the continent at large is the road transport. The road infrastructure is measured by

Connectivity: in space syntax, connectivity refers to the number of the lines that directly connects with other given lines and the pattern of people's movement and economic activity in cities can be predicted through spatial analysis that shows the connectivity and integration of spaces within the urban area (Xia 2013). Most connected location attracts more investment

Integration: this is a measure of the distance of a given street (or road network) to all other streets (networks). It measures the extent of integration of a given road network with others and is concerned with the shortest section or path from one street to all other streets with the Shorter section having higher integration value (Xia 2013). Locations with integrated road networks attract FDI and this is similar to the findings of Kumar (2001) who posited that the geographical distance between the home and the host country has a negative effect on FDI. Furthermore, distance reduces the capacities of countries to attract investment (Ndulu,2006)

Choice: the choice measures and evaluates the extent to which a given road network in a location belongs to the shortest path between any pair of a segment of road infrastructure network. It concerns the number of times the shortest path of a given road infrastructure is travelled through (Xia 2013). As through movement along the shortest path increases, trade and investment across the location also increase. Conversely as distance increases the flow of FDI declines. This is in line with Longo and Sekkat (2004),) for intra-African trade and Coulibaly and Fontagne (2005) for West Africa. They all found that as distance increases trade and investment declines. Similarly, Piet, et al. (2010), generated a realistic distance measure using spatial network analysis techniques, to compute the shortest distance of road that connect each pair between 83 urban areas in Africa found a 3% decrease in trade for each unit increase in distance between pairs and 2% increase in trade for each unit increase in road quality.

3.3.1.1.3 Other Independent Variables

Productivity: this is defined by the competitiveness of economies and competitiveness is measured by the world economic forum using the Global Competitiveness Index (GCI). The GCI pillar variables such as macroeconomic environment catalyst and institution burden used in this study 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. a set of dimensions and indicators corresponding to factors that contribute to inward Greenfield FDI in countries was selected. 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. Furthermore, 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 also 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 as well as the multicollinearity is removed by the process itself (Montero et al., 2010; Garcia et al., 2015).

To calculate the P2 distance, it 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, x_{ri}, 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:

$$dri=|Xri-X^*i|$$

where x′i is the r^{-th} element of the reference base vector

X′ = (x′1, x′2, . . ., x′n). For each variable, a reference value must be defined to compare different spatial entities. (Garcia et al. 2015).

In this study, Macro-Economic Environment and Institution are considered along with infrastructure network as major determinants of FDI based on the stage of competitiveness of countries (WEF,2015).
Macroeconomic Environment catalyst: this includes indicators that comprise of Government. budget balance and Gross national savings. This is an indication of macroeconomic stability and the economy cannot experience a sustainable growth with our stability of the macro- economic environment (WEF, 2015). This study, therefore, hypothesises a positive relationship between Greenfield FDI inflow and Macro-Economic Environment catalyst.
Institutional Burden: This variable was included in this model because recent studies have focused on its relevance on African economy. The quality of institutions and safety affects investment decision of MNE's as shown by Asiedu (2006) as well as Naude´and Krugell (2007). According to Globerman and Shapiro, (2002) and Alsan et al (2004), bureaucratic bottlenecks, corruption, crime and violence impedes the flow of investment into countries. The quality of the institution significantly influences investment decisions (Dunning, 2001) and Weak institutions leading to excessive bureaucracy and red tapes imposes a significant economic cost (WEF, 2015), and deters the flow of FDI into countries. In this model, the institutional burden is an index as shown in 2.1.4.1 consisting of Burden of Government regulation, burden cost of terrorism, business cost of crime and violence. The institutional burden has a negative impact on the inflow of FDI.

3.4.1.1.4 The independent control variables used are:

There are basically two main reasons why MNE's invest in a location other than their host countries. This includes serving a large and vibrant domestic market. hence, reduced trade barriers and low transportation cost are essential and this investment may be referred to as horizontal or market seeking FDI. The second reason involves the minimization of overall cost of production through reduction of factor inputs such as labour and raw material and these can be termed as vertical FDI or efficiency seeking / export -oriented FDI (Shatz and Venables, 2000; Alsan et al, 2004)
The data for the other independent variables serving as control such as the GDP a proxy for market size and total population a proxy for labour force is obtained from the World Development Indicators of the World Bank which has a primary collection of various development indicators from recognised international sources. The WDI is made up of over 1400 indicators of high-quality comparable statistics across 200 countries**.**
Market size: this is considered as an important determinant of FDI location, MNE's make FDI in countries with large market size in other to gain from economies of scales, reduced transaction and transportation cost. In addition, market size, measured by real GDP has a positive impact in directing FDI into the host country. GDP (current US $) is incorporated into the model as a proxy for market size with the expectation of positive coefficient for the inflow of FDI into both Africa and Europe (Dunning,2001; Asiedu,2006; Rehman,2010; Wheeler and Mody,1992).

Labour Force: the quantity, quality and cost of labour are a significant determinant of FDI, depending on whether it is market seeking, efficiency seeking, resource seeking FDI. Kumar, (2001) used wage as

a proxy for labour cost. For this study total population will be used as proxy for availability of workforce as used by Burdina (2004)

Dummy Variables

In this analysis, Dummy variables were used and these variables are useful tools in econometrics for qualitative rather than quantitative variables such as strategic locations, corridors, regional economic community and sub-regions. The dummy variables split the sample into several distant groups such as strategic location, Regional Economic Integration (REC), Region, Subregion, Language, Corridor as shown in ANNEX 1.

Strategic location: the geographical proximity of an economy is a major determinant for FDI inflow. According to Gallup et al. (1999), and the comparative advantage of a given location in terms of its strategic geographic location can be utilised as a factor for attracting FDI. Thus, economies geographically located in the coastal regions and having high accessibility to international trade via seaport outpace those economies that are landlocked. The works of Alsan et al (2004) and Ndulu (2006) showed that countries bounded by coastal regions in Africa tend to attracts more FDI than those in the hinterland, this could be due to their accessibility to trade across the continent through the ports. Dummy for landlocked and coastal corridors are used

Regional Economic Community: the integration of a region or continent into the global economy is essential for economic growth and development and one of the fastest way of achieving it is the Regional Economic Community (REC). These are regional groupings that facilitate Regional Economic Integration among member states and other regions. This stimulates competition, improves subsidiarity, increase the access of member states to a wider market through trade and diversified investment (Maruping,2004). Dummies were created for six out of the eight REC's in Africa recognised by AU. They include: Economic Community of West African States (ECOWAS)=1; Southern African Development Community (SADC)=2; Arab Maghreb Union (AMU)=3; Economic Community of Central African States (ECCAS)=4; Common Market for Eastern and Southern Africa (COMESA)=5; East African Community (EAC) =6 for Africa and European Union(EU) =7 and Non-European Union (Non- EU) =8 for Europe.

3.4.1.2 The Primary Data

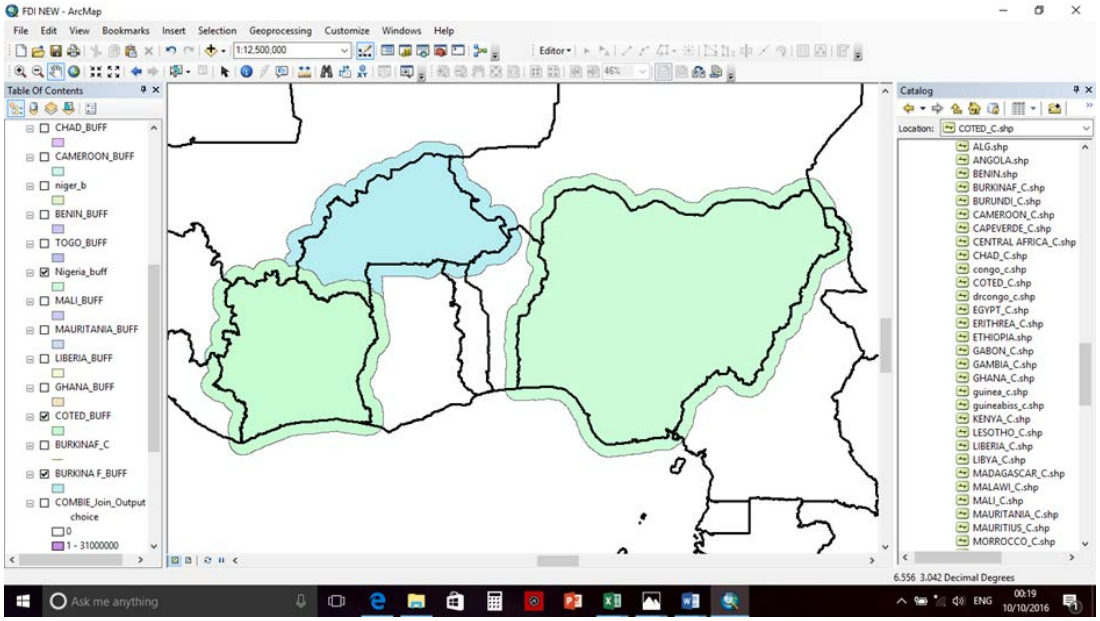
The primary data extraction and analysis involves two analytical methods of GIS analysis and space syntax analysis and the relationship between two spatial characteristics (infrastructure networks and the location of MNE's- the driver of FDI can be investigated by showing the spatial pattern of infrastructure networks in Africa and Europe using GIS and space syntax technique.

3.4.1.2.1 ArcGIS Analysis

The use of ArcGIS 10.4.1 software was essential in this analysis and data for use in DepthMapX was extracted.

I. The shape files of the countries and the world road base map layer representing the highways, major roads, local roads and ferries of the world was obtained from ESRI and the Vector data was last modified on the 22nd of July 2016 and stored as ESRI shapefiles (ESRI, 2016)
II. The networks were carefully selected using the Structured Query Language (SQL) so as only Highways and major roads were used. The ferry lines and local roads were eliminated, since regional network is considered
III. Each country shapefile was buffered at a 50km radius to take care of edge effect and externalities of the road. This enables us to clip the road network with an extension of 50 km beyond the country boundary so as to acquire the area of influence of the road network as shown in figure 3.1 below

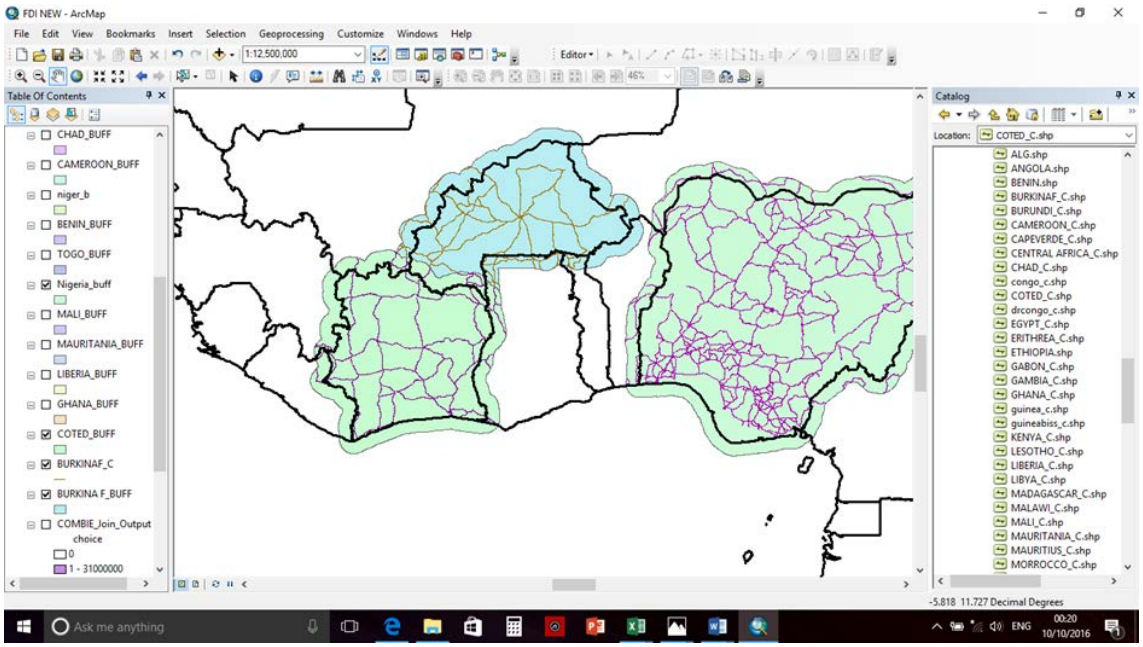
Figure 3. 1: 50km Country Buffer



IV. Ensured all the lines are well connected. Be sure to eliminate or link isolated segment

V. The buffered shape file is the clipped to the existing road network of each country as shown in Figure 3.2 below and saved in a drawing format by exporting to CAD. This will then be used in DepthMap.

Figure 3. 2 Buffered Country Boundary with Clipped Road Network



3.4.1.2.2 Space Syntax Analysis

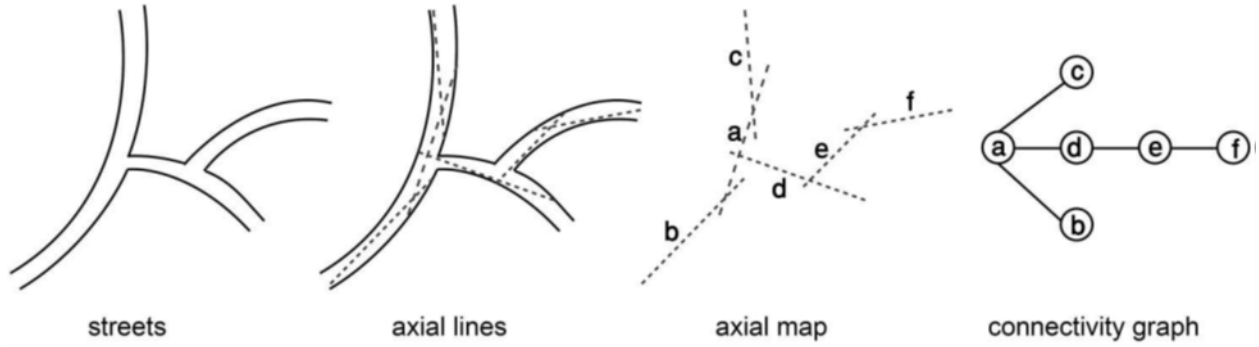
Space syntax provides a feasible method to quantify and evaluate the relationship between the location of MNE's that carry out FDI in a host country and accessibility provided by the transport infrastructure networks. For transportation systems, space syntax can be used to expound the suitability of the overall road, rail or port network and the features of spatial structures (Huang, and Hsieh, 2014) since Space is the unit within which all human activities occur. The spatial configuration of the road networks of the

countries was analysed using the space syntax methodological framework. This framework proposes a topological-visual method of analysis. The rudimentary component of this framework is showed by hypothetical road networks where the construction of the axial map is on the basis of a network of straight lines representing the street system called axial lines (Hillier and Hanson 1984) as shown in figure 3.1 below. The network analysis is centred on an axial map. This map outlines the minimum set of straight visual lines known as axial lines covering the entire neighbourhood, city and country network (Omer and Goldblatt,2015). The space syntax analysis is performed on the axial map.

The road networks from ESRI Shapefiles obtained is first converted into an axial map, which is a representation of small-scale spaces within the built environment in cities and countries at large.

The axial map is then converted into a connectivity graph, where the nodes and links of the graph are well-defined by the axial lines and the point of intersections of the axial lines.

Figure 3. 3: **Space syntax framework**



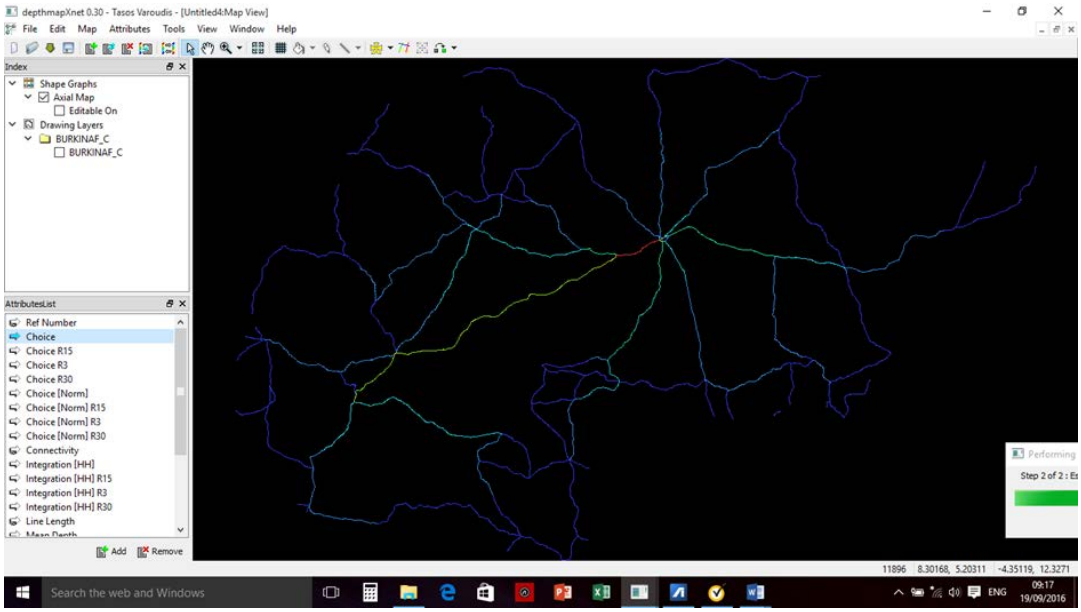
Source: Omer and Goldblatt (2015)

Most of the studies that utilise the space syntax framework for studying the relationship between the urban street network and retail patterns make use of "axial maps" as a basis for calculating the centrality measure, and only a few exceptions have used segment maps (Hillier, 2009; Vaughan et al., 2010). Therefore, for this study, axial maps were also used instead of segment map to determine the spatial characteristics such as the global and local integration values, connectivity, as well as the control value of the infrastructure (transport) network. This will show how investment patterns in cities are shaped by networks of road infrastructure.

Axial map analysis

I. The CAD format axial lines from the ArcMap is exported in a drawing map format and is imported and displayed in the drawing layer of the DepthMap.
II. To create an axial map in DepthMap, the imported file is converted to an axial map using drawing command as conducted by Jiang (2010) and Xia (2013).
III. The graph analysis using UCL DepthMap is run in order to obtain the global measures at various radial distances (N, 3,15,30). Where N is a global measure, R3 is used for investigating pedestrian movement, since this movement is limited to three levels of pedestrian trips whereas vehicular trip within cities is limited to ten to 15 levels designated by R15. For this studies, we considered an additional 30 levels of vehicular trips R30 since the road networks include highways within and between countries. The connectivity, integration and choice measures are obtained as shown in Figure 3.3 below.
IV. The output is saved in the form of an attribute table in a CSV format so it can be used for further analysis or displayed using a GIS software.

Figure 3. 4 Choice Measure from Space Syntax Analysis using DepthMapX



3.5 Data Analysis Methods

3.5.1 Panel Data Analysis

The study was analysed by OLS regression using a balanced panel data which is also known as longitudinal or cross-sectional time-series data. it is a dataset in which the behaviour of entities (countries) is observed across time (Torres-Reyna, 2007). The use of panel data for the study of dynamic relationships (change over time), as well as to model the differences among entities, is important for estimation of causal and treatment effects and provision of superior estimates of association (McManus,2011). Generally, panel data is more efficient than pooling cross section since it reduces the variance by having the observations of entities over a period of years compared to the unsystematic selection of set of entities.

This provides a large number of data points thereby increasing the degree of freedom and collinearity among explanatory variables. Furthermore, panel analysis is imperative for addressing economic enquiries across entities that cannot be easily expounded using time series or cross-sectional data.

The choice of a balanced panel data is preferred over unbalanced since it is proficient and the workload is minimal compared to unbalanced panel data which requires several mathematical computations and test.

The dependent variable, Global Economic Integration (measured as Foreign Direct Investment (FDI) inflow) and independent or predictor variable, measures of infrastructure as well as the other location factors and competitiveness factors were chosen based on empirical and theoretical studies. Panel data controls for variables that cannot be observed or measured. It also controls for variables that change over time but not across entities, thereby accounting for the heterogeneity of the entity. The analysis was carried out using the random Effect Technique.

3.5.1.1. Fixed or Random effect

The decision between using the fixed and random effect model was made by running the Hausman test for the" Exogeneity of the Unobserved Error Component" as stated by McManus (2011).

The Hausman test checks the suitability of the most efficient model against the less efficient but consistent model. This ensures that the result of the most efficient model is also consistent (Princeton University Library,2007:). The null hypothesis (H_0) for the Hausman test assumes that the differences in the coefficient is not systematic (random) and stated as follows:

$H_0 = \beta_{RE} = \beta_{FE}$

Where β_{RE} and β_{FE} represents the coefficient vectors for the time-varying explanatory variables, this excludes all time variables. The null hypothesis for Hausman test that random effect is the preferred model in relation with the fixed effect which is the alternative (Greene, 2008) and the insignificant result of the chi^2 the null hypothesis was accepted hence random effect was used for all the analysis.

In random effect model, the variation across entities (countries) is assumed to be random and uncorrelated with the dependent or independent variables included in the model. This model contrary to the fixed effect model which studies the causes of variations within an entity (Torres-Reyna, 2007). The random effect model allows inferences to be made about the population the sample is drawn from. It is an appropriate model for the following reasons:

- It is believed that differences across entities (countries) have some influence on the dependent variable (inflow of investment)
- Time invariant variables can also be included in the random effects whereas it is absorbed by the intercept in the fixed effect model.
- It also explores the relationship that exists between the independent or predictor variable (infrastructure) and the dependent or outcome variables (GEI as FDI) across these entities (countries in Africa and European regions as well as those along the Lagos-Abidjan and the North-Sea Mediterranean corridor)

Equation 3. 1: Equation for the Random Effects Model

$$Y_{it} = \beta X_{it} + \alpha + u_{i,t} + \varepsilon_{it}$$

Where:

- α_i (i=1….n) is the unknown intercept for each entity (n entity-specific intercepts).
- $Y_{i(\text{Burger et al., 2013}).\ t}$ is the dependent variable (DV) where i = entity and t = time.
- $X_{i,t}$ represents one independent variable (IV) or predictor
- β_1 is the coefficient for that IV,
- $u_{i,t}$ is the Between-entity error
- ε_{it} is the Within-entity error

The model

Equation 3. 2: Equation for Question 1a&b

$$\text{Total\_FDI}_{i,\,t} = \alpha + \beta_1\ \text{Infra\_Ntwk}_{i.t} + \beta_2\ \text{ME\_Stability}_{i.t,} + \beta_3\ \text{Market\_Size}_{i,\,t} + \beta 4\ \text{Labor\_Force}_{i,\,t} + \beta_5\ \text{Instn\_Burden}_{i,\,t} + \text{Strategic Location}_{\,i,\,t\,+}\ u_{\,i,t} + \varepsilon_{i,t}$$

Equation 3. 3: Equation for Question 2

$$\text{Sector\_FDI}_{i\,t} = \alpha + \beta_1\ \text{Infra\_Ntwk}_{i.t} + \beta_2\ \text{ME Stability, t} + \beta_3\ \text{Market\_Size}_{i,\,t} + \beta_4\ \text{Labor\_Force}_{i,\,t} + \beta_5\ \text{Instn\_Burden}_{i,\,t} + \text{Strategic Location} + u_{\,i,t} + \varepsilon_{i,t}$$

3.6Validity and Reliability

In order to ascertain the validity of this study, it was ensured that the relationship between infrastructure and GEI is measured as the inflow of FDI by statistically running a correlation analysis. This gives the conclusion validity. The causal relationship between the variables infrastructure and FDI inflow was established by controlling for other instrument variables that may influence the inflow of FDI such as GDP, Macro- Economic Environment catalyst, Total Population, Market Size amongst and others this constitute the internal validity.

To be able to attribute the inflow of FDI to infrastructure networks the constructs was properly operationalized so as to capture appropriate measures, this is construct validity (Trochim, 2006). And lastly to be able to claim and generalise causal relationship from the research findings for other countries and sub-regions in Europe and Africa a representative sample from all African and European countries were selected based on the availability of data and this constitute the external validity.

In this study, before the panel data regression was carried out several tests were conducted and the assumption test includes:

a) Test for normality: this is based on the assumption that Residuals behave 'normal'. A graphical representation of Kernel density and a non-graphical test (Shapiro-Wilk test) was used.

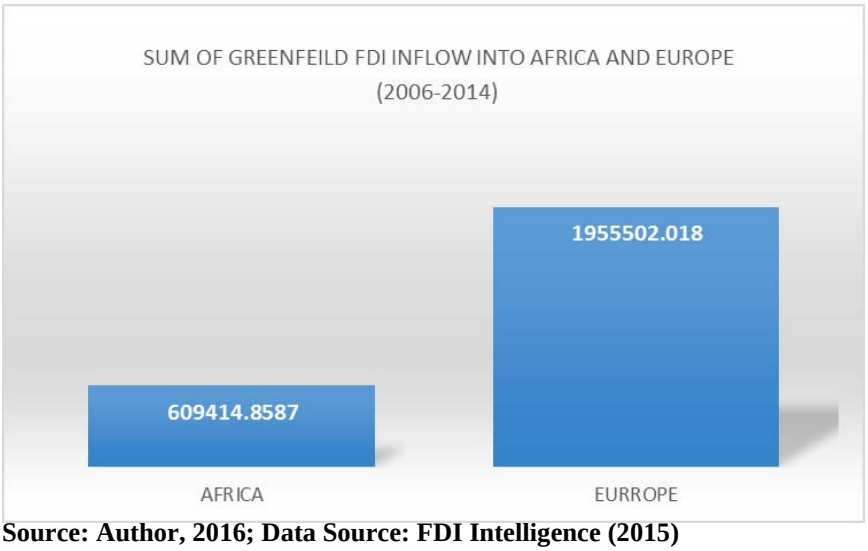
b) Test for homoscedasticity: Based on the assumption in the regression that variance of the errors remains constant across all observation (homoscedastic) and when errors are heteroscedastic the standard estimation methods are inefficient. Thus the test helps to establish the presence of non-constant variance using the Breush and Pagan test. And heteroscedasticity was corrected with robust regression.
c) Test for multicollinearity: indicates a strong linear relationship between the independent variables and might have inefficient impacts on multiple regressions. The test is based on the assumption that independent variables in the regression are not perfectly multicollinear. Hence, the vif test was conducted and variables with vif higher than 10 were removed.
d) Test for linearity: this is based on the assumption that relationship between the dependent and independent variable is linear. To correct for non-linearity, the logarithm of the skewed variable was generated (logFDI, logGDP).
e) Test for independence: this is based on the assumption that there is no correlation between errors associated with an observation with the errorrs of any other observation over different circumstances. Hence, the time variable using (tsset country_id year) was declared and a Woolridge test (xtseriallnyx1 x2 x3) was performed. The result of F-statistics was insignificant therefore, the null hypothesis was accepted.
f) Test for model specification: based on the assumption that in the model the error term and the independent variables are not correlated. Using the ovtest after a regression, the F-statistics was not significant. hence, the model specification is correct

Chapter 4: Research Findings and Analysis

4.1 Descriptive Analysis of Foreign Direct Investment in Africa and Europe

Globally, greenfield FDI is continuing its gradual recovery despite the economic uncertainties and political risk. In 2013 the greenfield FDI grew by 10.9% across the globe (FDI Intelligence, 2014). However, this growth is not uniformly distributed. While Africa recorded growth in FDI of 10.76%, in 2013, and Europe witnessed a decline by 12.08% in comparison with 2012 (FDI Intelligence, 2014). The volume of FDI into Africa still remains small compared to other regions of the world as shown in Chart 4.1 below.

Chart 4. 1: Total Greenfield FDI inflow to Africa and Europe

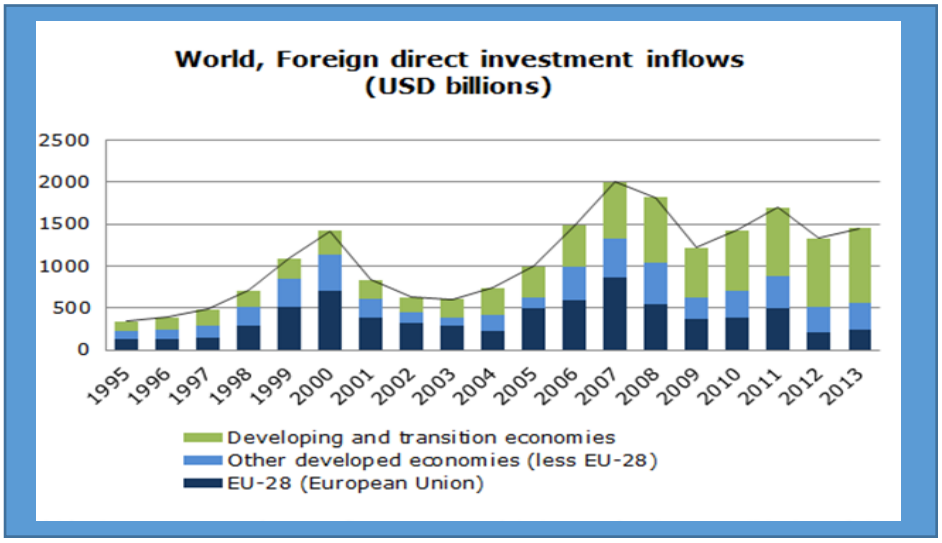


Source: Author, 2016; Data Source: FDI Intelligence (2015)

4.1.1 FDI in Europe

Europe remains the largest investor and recipient of FDI (both Merger/Acquisition and Greenfield) despite the global FDI decline and increasing significance of emerging market in FDI (European commission,2014) as shown in Chart 4.2 below.

Chart 4. 2: Global Distribution of FDI inflow

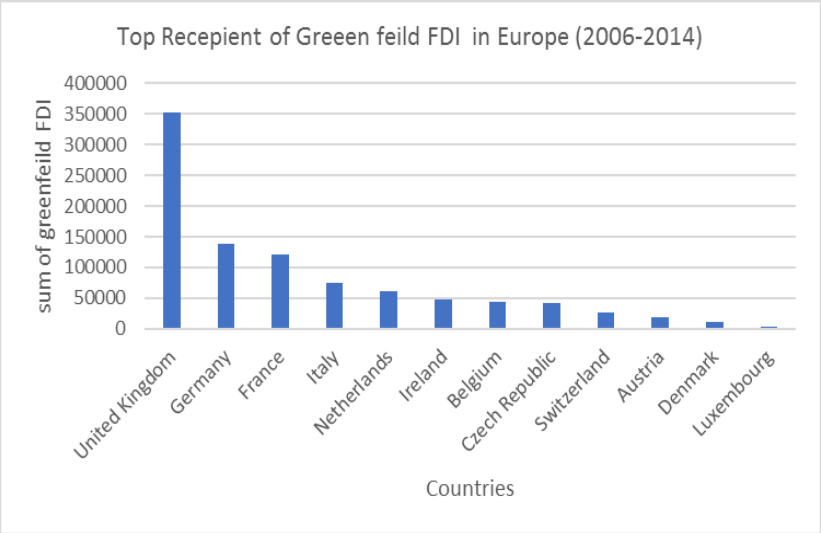


Source: European commission (2014)

According to the European commission (2014), total FDI (both mergers and acquisition and greenfield) is predicted to increase on average by 2.5% per annum over the next five years and the inflow of FDI to the EU has increased by 14% in 2013 after experiencing a decline in previous years due to the global

financial crisis. However, the inflow of greenfield FDI declined in the same year by 12.08% (FDI Intelligence,2014). This changes could be as a result of some policies adopted to make EU more attractive for FDI and are aimed at expanding and upgrading Europe's infrastructure and its scientific base, extending and deepening the single market, amongst others (European commission,2014). From 2006- 2014 the total sum of greenfield FDI into Europe is $1955502.018bn with the United Kingdom receiving the largest share alongside Germany Spain, France Italy and Netherland in Western Europe and the region accounts for 58% if the total FDI, while in Eastern Europe Russia is the largest recipient of greenfield FDI alongside Romania, turkey, Bulgaria and Hungary as shown in Chart 4.3 below.

Chart 4. 3: Top Recipient of Greenfield FDI from 2006 -2014

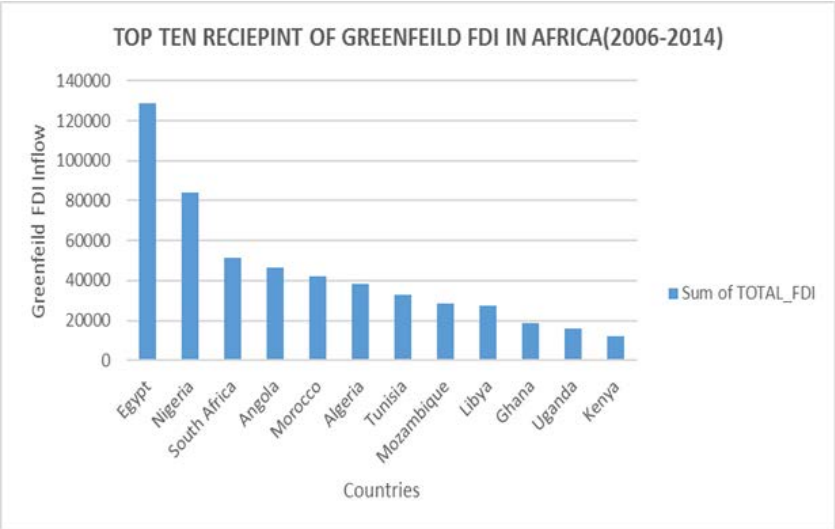


Source: Author,2016; Data Source: FDI Intelligence (2015)

4.1.2 FDI in Africa

The Global decline in FDI affects the economies of the world differently. This difference could be due to the difference in the economies or the nature of FDI. According to United Nations Conference on Trade and Development, (2015**),** the Global inflow of FDI declined by 16 percent in 2014, However, there was an increase in FDI in developing countries and Africa, as a continent account for 4.4% of this increase. Based on this study, the total flow of greenfield FDI to Africa from 2006 to 2014 is $609414bn with Egypt receiving the largest share alongside Nigeria, south Africa, Angola and Morocco as shown in Chart 4.4.

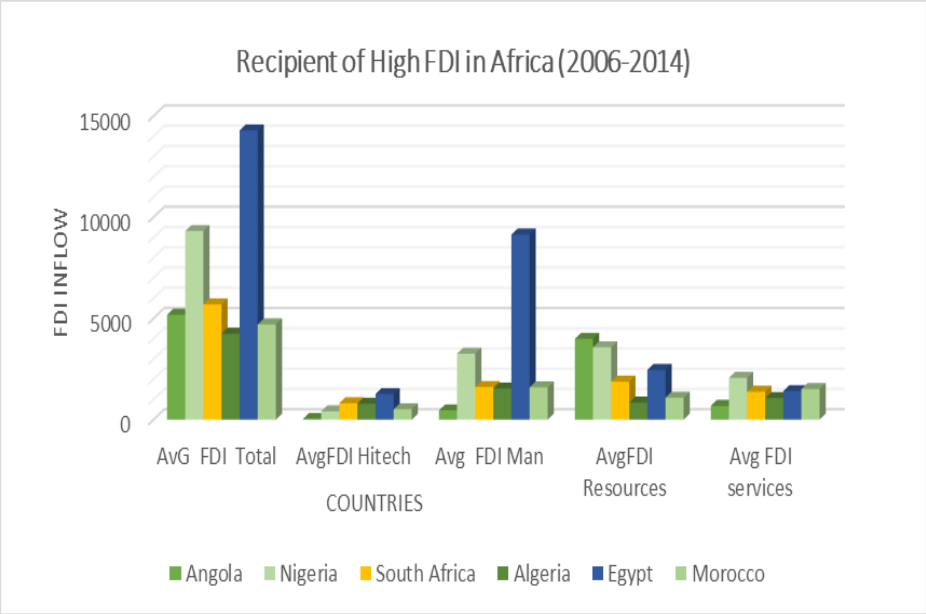
Chart 4. 4: Top Recipients of Greenfield FDI in Africa



Source: Author,2016; Data Source: FDI Intelligence (2015)

The manufacturing sector accounts for 43% of the total inflow with Egypt accounting for a higher proportion of both total greenfield FDI and FDI into manufacturing sector and Hitech sector, whereas Angola then Nigeria attracts higher investment into resources sector, mostly into oil, metals and ores, while South Africa attracts moderate investment in all the sectors. as shown in Chart 4.5

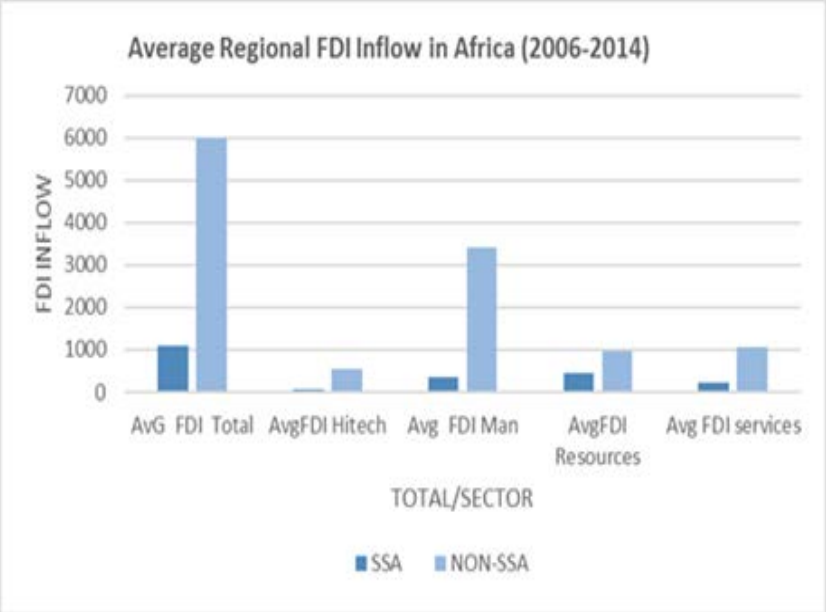
Chart 4. 5: Top recipient of FDI by sectors in Africa



Source: Author,2016; Data Source: FDI Intelligence (2015)

The highest average inflow of total FDI as well as FDI into various Sectors in Africa from 2006-2014 is directed toward the non-Sub-Saharan Africa as shown in the Chart 4.6 below. This could be attributed to the fact that the three major recipients of FDI in Africa are from this region and language and religion could also play an important role since a significant proportion of their inflow is from the Middle East in comparison with the Sub-Saharan Africa (SSA).

Chart 4. 6: Regional inflow of FDI by sector in Africa

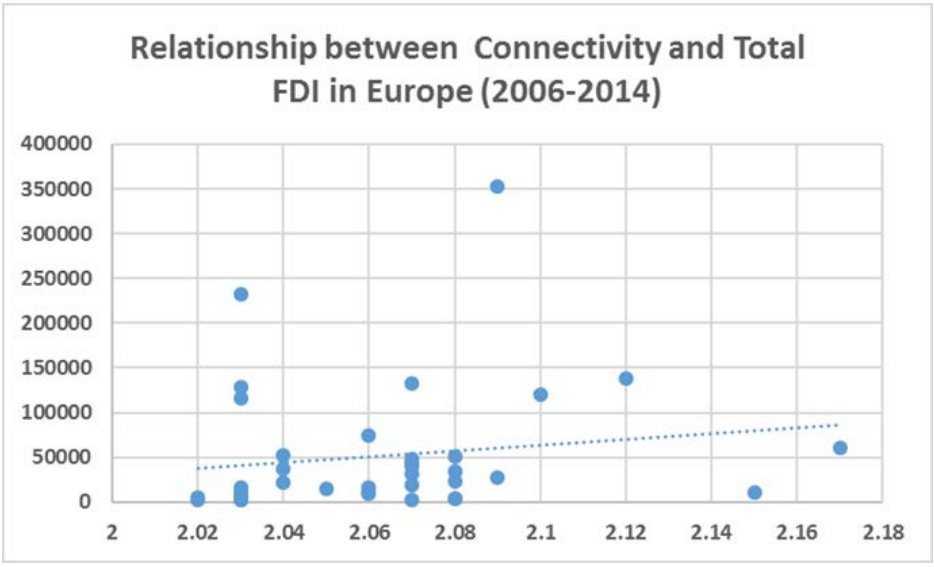


Source: Author,2016; Data Source: FDI Intelligence (2015)

4.2 Descriptive Analysis of Infrastructure Network in Europe and Africa

The availability of good infrastructure is essential for the efficient performance of any economy and Physical infrastructure also influences the pattern of inward FDI into countries. Countries and regions requirement for infrastructure varies based on their stage of economic growth and development such that as economies evolve so does their infrastructure needs. The scatter plot in Chart 4.7 shows the linear relationship between connectivity measures of infrastructure network and Total FDI to Europe. It suggests that FDI tends to increase Europe at a gradual pace with increasing connectivity. This is a positive correlation and this could be attributed to the already developed infrastructure in the region and further increase may yield minimal or no significant effect.

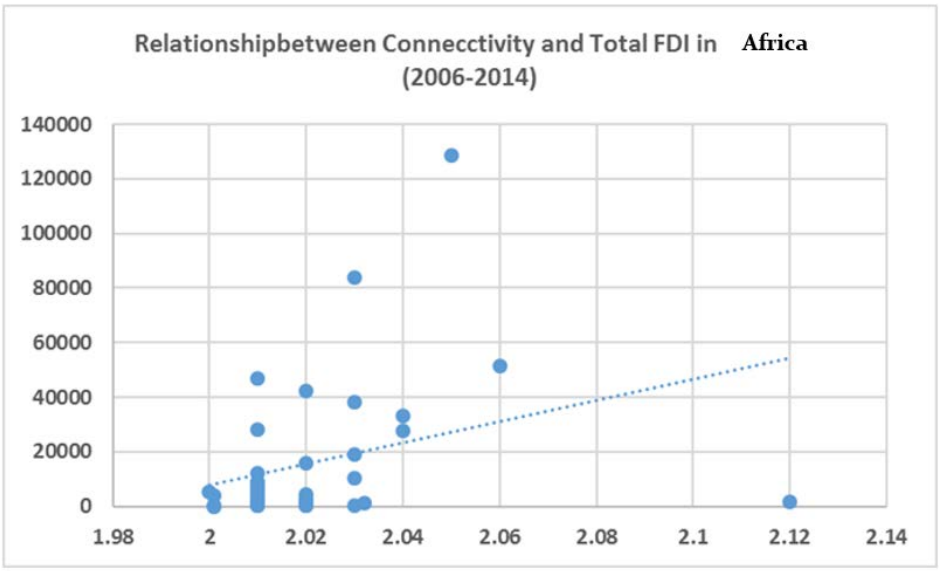
Chart 4. 7: Relationship between Connectivity and FDI (Europe)



Source: Author ,2016

In Africa, the increase in greenfield FDI relative to the increase in infrastructure network is positively correlated at a faster rate than Europe as seen in Chart 4.8 below. This may suggest that development of infrastructure in this region has the capacity to enhance FDI inflow.

Chart 4. 8: Relationship between connectivity and FDI (Africa)

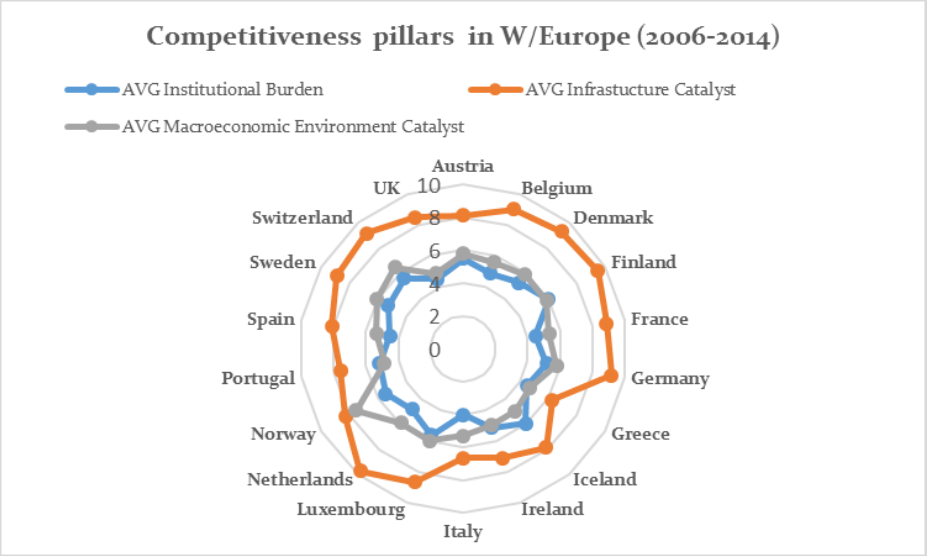


Source: Author ,2016

4.2.1 Regional Distribution of Infrastructure and other Competitiveness Pillars

The availability and quality of infrastructure vary among regions in both Europe comprising of Western Europe (W.E) / Eastern Europe (E.E) and Africa, comprising of Sub-Saharan Africa (SSA) and Non-Sub-Saharan Africa (Non-SSA).

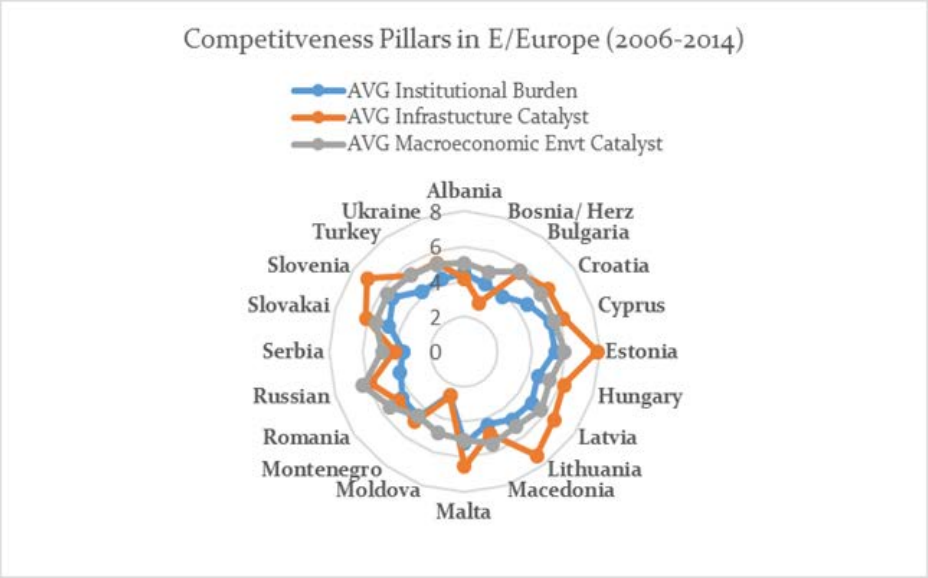
Chart 4. 9: Competitiveness Pillars in Western Europe



Source: Author,2016; Data Source: WEF (2015)

Most Western Europe countries rank higher than their counterpart in Eastern Europe, with the exception of members of EU such as Estonia, Slovenia and Lithuania in infrastructure. Chart 4.9 above and Chart 4.10 below shows the position of countries regarding location factors (as competitiveness pillars) of host countries in Europe in terms of infrastructure, institutions and macroeconomic environment This may be as result of policies on provision of infrastructure by the European Union of which most western European countries belong, such as the Trans-European Transport Network policy known as the TEN-T policy (European Council, 2014;TENtec Reporting, 2014), Road Maintenance and Development Programme (RMPD) of the European Union (2014).

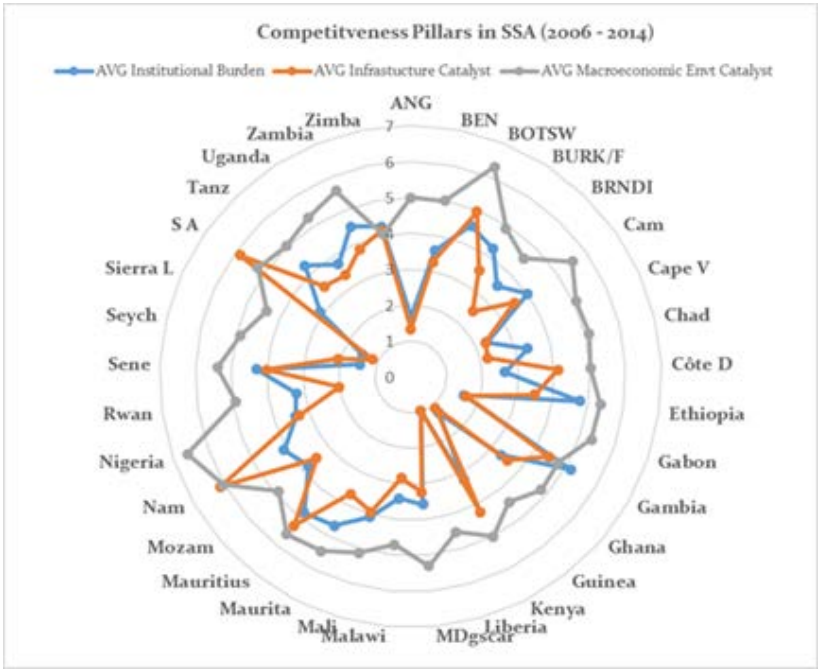
Chart 4. 10: Competitiveness Pillars in Eastern Europe



Source: Author,2016; Data Source: WEF (2015)

Most countries in the SSA ranked below the average, having about nine countries 9 countries predominantly from west Africa ranking below the average of 3.25 for infrastructure. whereas most Southern African countries and some few East African countries performed above average. This could be attributed to regional infrastructure provisioning of SADC and EAC

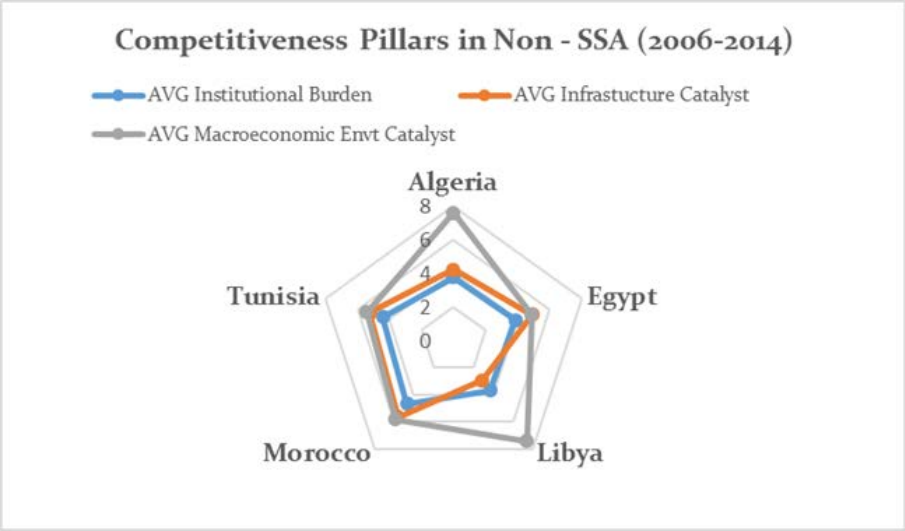
Chart 4. 11: Competitiveness Pillars in Sub-Saharan Africa



Source: Author,2016; Data Source: WEF (2015)

Conversely, countries in Non-Sub Saharan Africa in this study all ranked above average in the competitiveness pillars as shown in chart 4.11 and chart 4.12 respectively.

Chart 4. 12: Competitiveness Pillars in Sub-Saharan Africa



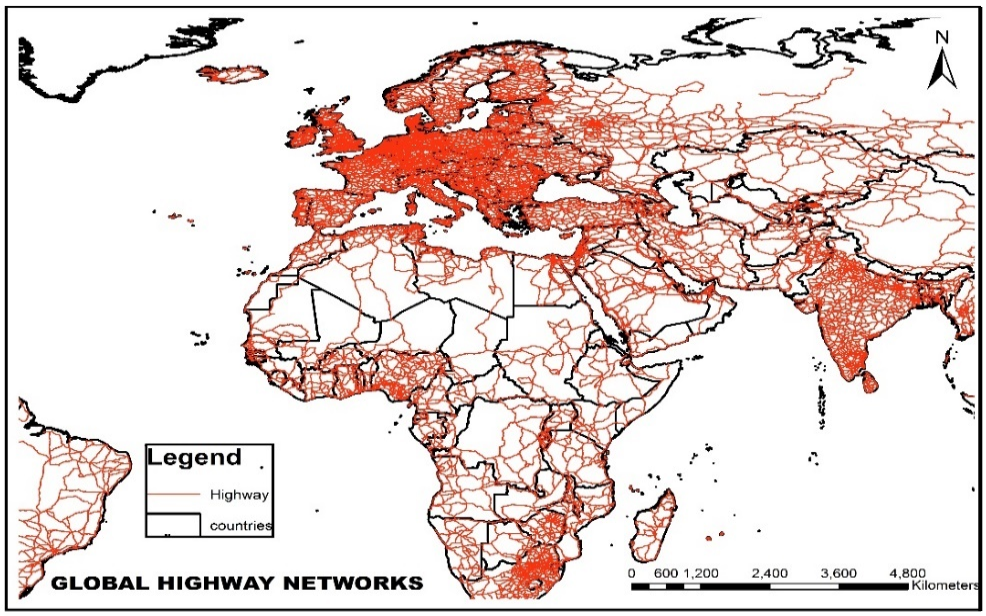
Source: Author,2016; Data Source: WEF (2015)

4.2.2 Road Network in Europe and Africa

The availability and quality of hard physical infrastructure (road network) is significant for economic growth and it is an important location factor in attracting FDI globally. According to Crescenzi, et al. (2015), in the European Union (EU) in particular, and Europe in general, the development of infrastructure has formed part of the bedrock of the strategies for regional development and is regarded

as an instrument for equitable distribution of the benefit of the European integration process. Figure 4.1 below explicitly shows the difference in the density of road network in Europe (particularly Western Europe) and that of Africa (particularly Western African). The connectivity is sparse in Africa with the exception of some part of West Africa (where L-A corridor is located) with some few length of highways linking the West to the North of Africa across the Sahara Desert, and in South Africa in the Southern region.

Figure 4. 1: Distribution of Road Network in Europe and Africa

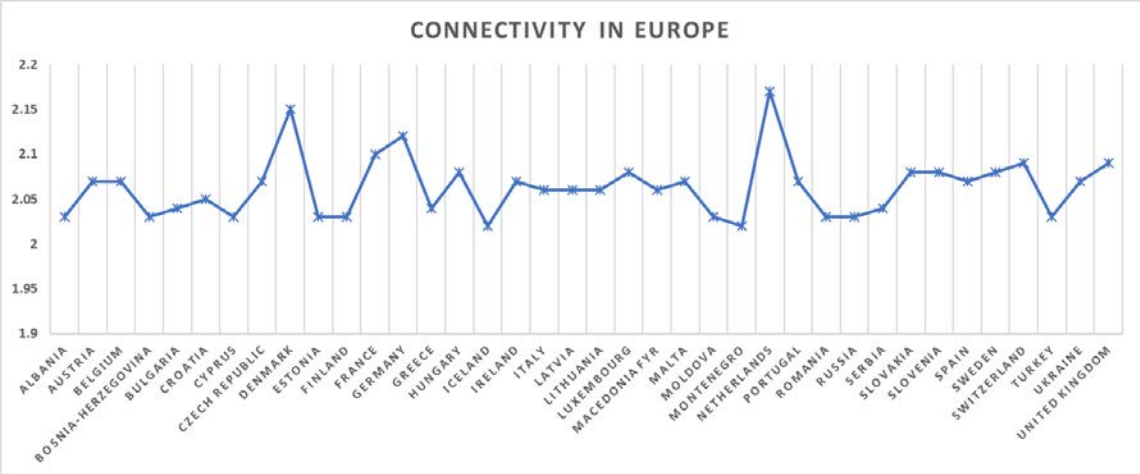


Source: Author,2016. Data source ESRI 2016

4.2.3 infrastructure Network Measures

The average connectivity in Europe is 2.08 and Netherlands have the highest measure of 2.17 while Iceland and Montenegro have the lowest with 2.02 as shown in chart 4.13 below.

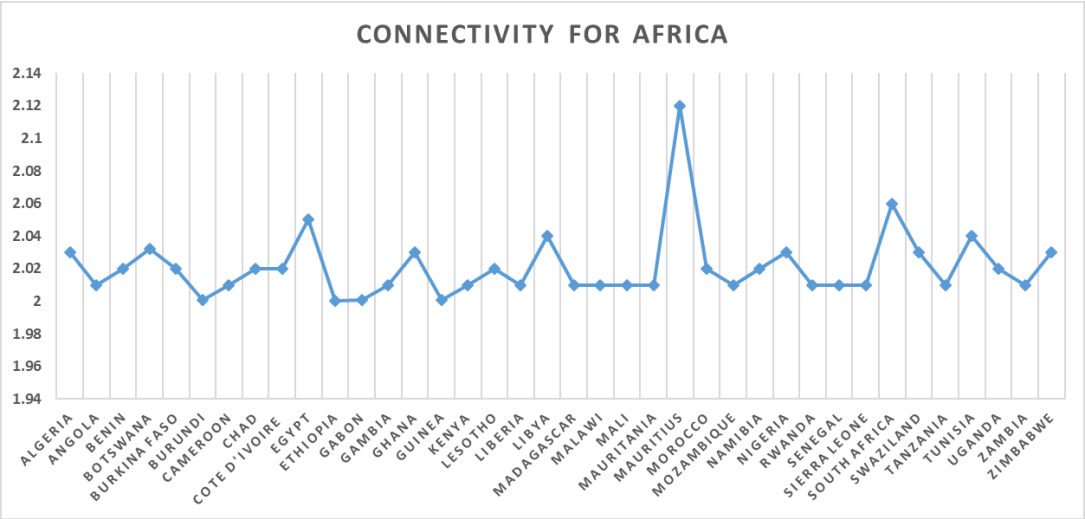
Chart 4. 13: Average Connectivity Measures in Europe from 2006 -2014



Source: Author ,2016

In Africa, the average measure of connectivity is 2.02 and Mauritius (for smaller countries relative to size) has the highest measure of 2.12 while south Africa (for larger countries relative to size) has the highest value of 2.06 and the lowest is Ethiopia with a measure of 2.00 as shown in chart 4.14 below. This could be as result of good road infrastructure in Mauritius which is termed as the country with the best performance in infrastructure (Ranganathan and Foster ,2011), and south Africa with high quality of infrastructure

Chart 4. 14: Average Connectivity Measures in Africa from 2006 -2014



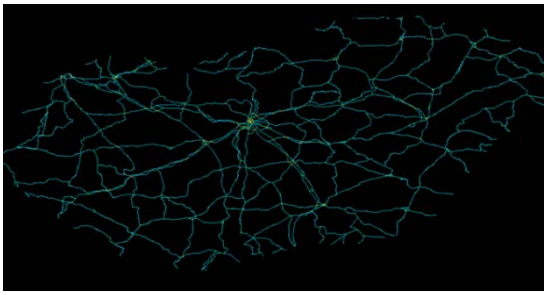
Source: Author ,2016

Connectivity in Africa and Europe

The Figure 4.2 below shows the connectivity of some countries as measured by space syntax analysis. The most connected areas are marked red and graduated to orange, yellow, light blue and finally deep blue in the less connected region and it is assumed that retail MNE's and headquarters are located in the most connected sections.

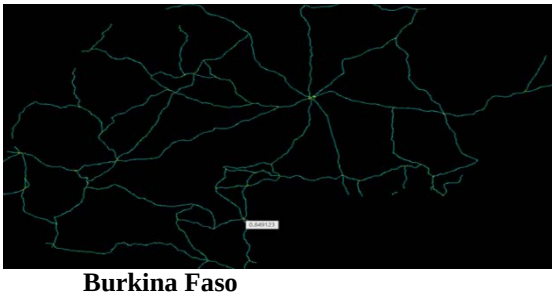
Figure 4. 2: Connectivity of Road Network of some countries in Africa and Europe

Netherland



Hungary

South Africa



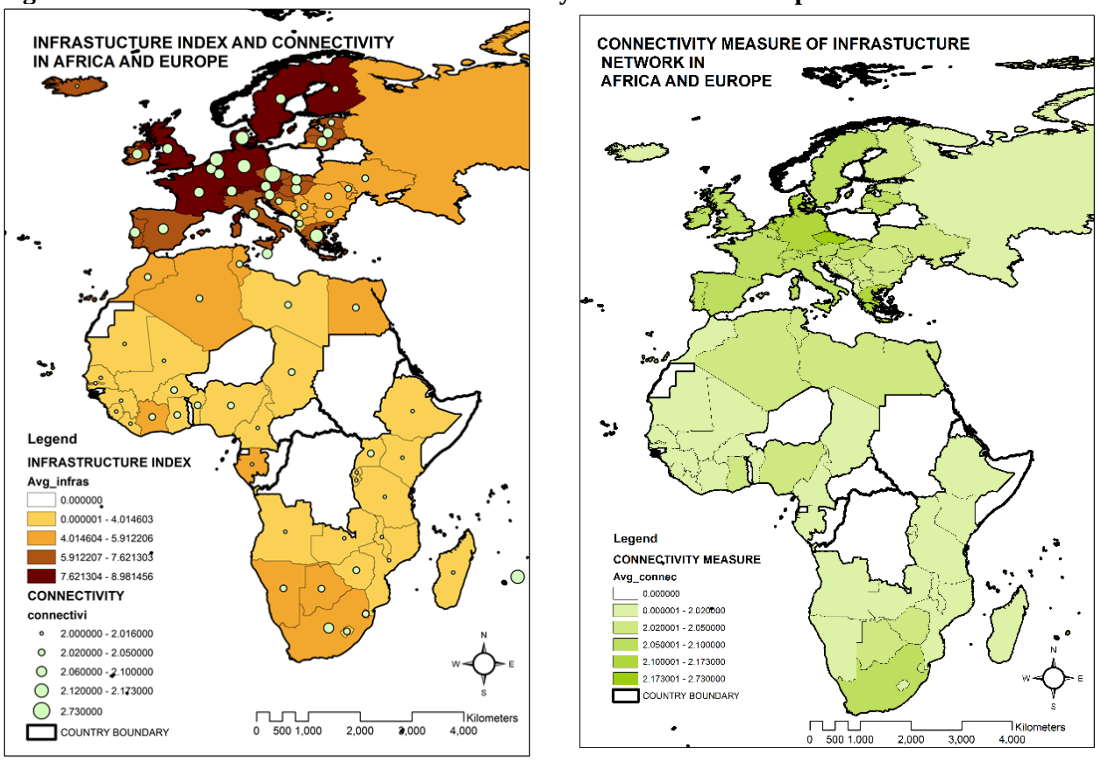
Burkina Faso

Source: Author,2016. Generated from Space syntax

Infrastructure Index and Connectivity in Africa and Europe

The infrastructure index is higher and the network of road infrastructure is more connected in Western Europe and the E.U states such as Netherland and Hungary with higher values of connectivity measures as shown in Figure 4.3 below. Additionally, countries with high infrastructure index have good connectivity measures. Similarly, in SSA, some Southern African states like South Africa and Mauritus have good quality of infrastructure while Non-SSA countries have average infrastructure index and connectivity.

Figure 4. 3 Infrastructure Index and Connectivity in Africa and Europe

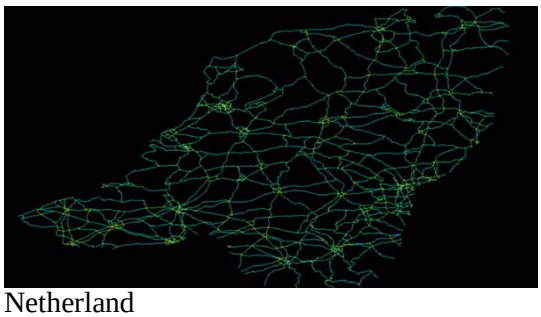


Source: Author ,2016. Data source: ESRI, 2016;

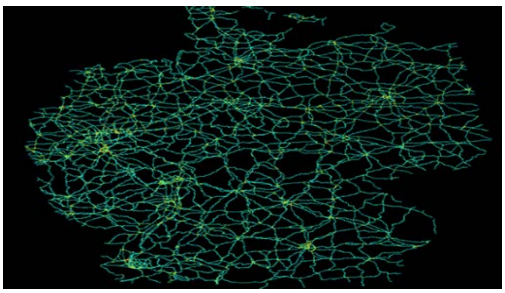
Integration in Africa and Europe

The graduation of colours from red (most integrated), yellow to blue (least integrated) as shown in figure 4.4 below indicating the propensity of a given location to serve as a possible destination for MNE's as they carry out FDI.

Figure 4. 2: Integration of Road Network of some countries in Africa and Europe

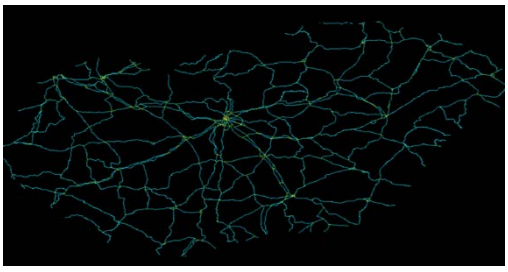


Netherland



Germany

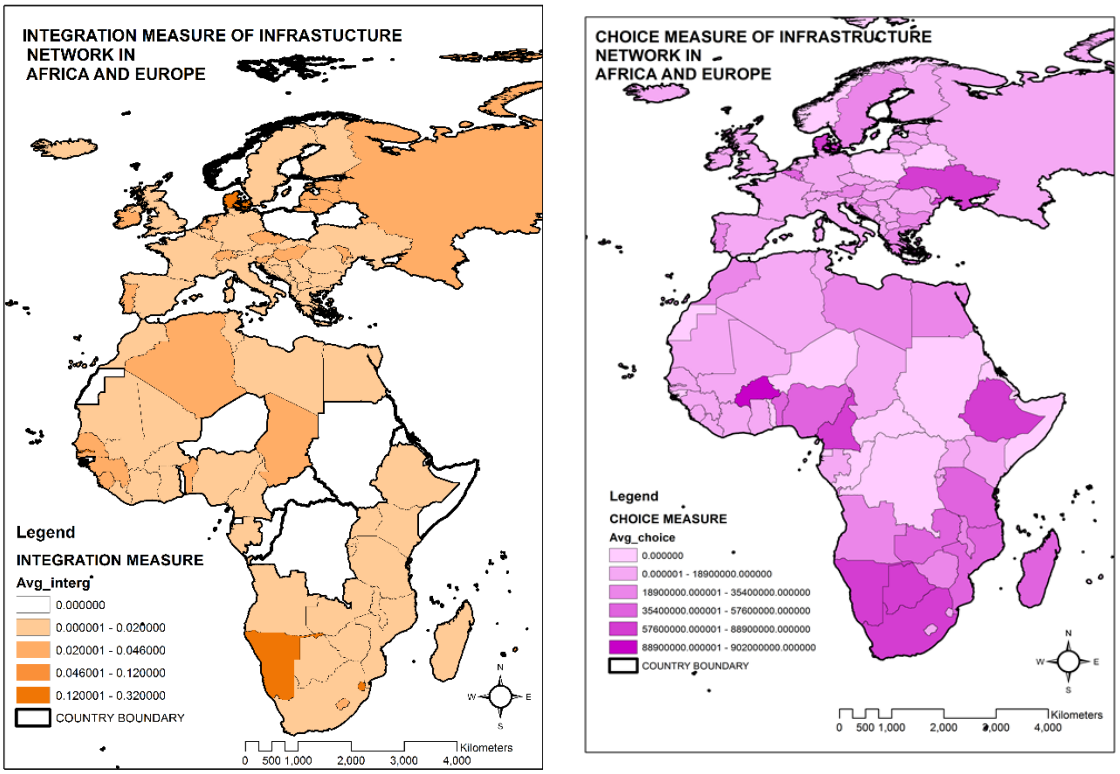
South Africa



Hungary

Source: Author,2016. Generated from Space syntax

Integration and Choice measures of infratrucutre Network

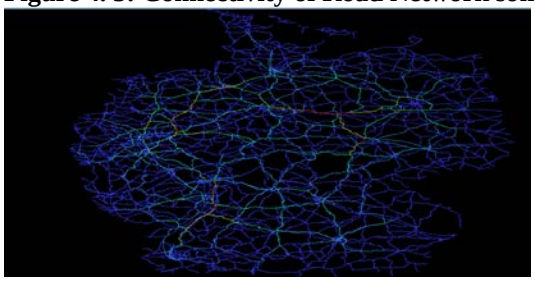


Source: Author ,2016. Data source: ESRI,2016

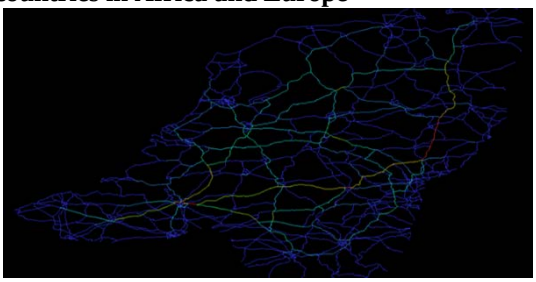
Choice in Africa and Europe

The colour graduation shown in figure 4.5 belowranges from red indicating the most preferred route for through movement by MNE's to deep blue indicating locations with least choice. High level of choice indicates locations with a high propensity for easy movement through the shortest path. Most Southern African and few Eastern Africa and Western African such as Burkina Faso and Nigeria countries have high choice values

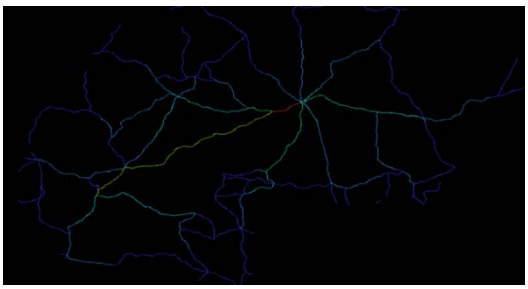
Figure 4. 3: Connectivity of Road Network some countries in Africa and Europe



Germany



Netherland



Burkina Faso

Nigeria

Source: Author,2016. Generated from Space syntax

Q1a Does infrastructure network determine the inflow of FDI into Africa and Europe?

4.3 Inferential Analysis of Infrastructure Network and Greenfield FDI Africa and Europe

4.3.1 Connectivity and greenfield FDI

The Table 2.1 in ANNEX 2 shows the estimation results of the model used in the study, from the results with 323 observations (model) and R-squared value of 0.65 indicates that 65% variation in the dependent variable is accounted for by the estimated equation in Europe. This implies that 65% variation in the total FDI inflow in Europe is caused by the independent variables in model 5. From the result, the measure of connectivity a proxy for infrastructure network has a significant positive impact on the inflow of total FDI to Europe with a coefficient of (1.29). It is statistically significant at less than 5 percent level of significance and it is capable of determining the variation in the inflow of FDI IN Europe. Connectivity refers to the total number spatial unit directly connected or linked to each individual spatial unit in a network it is a measure of how connected a given location is other locations. This implies a unit increase in the capability of a particular spatial unit(country) in Europe to be connected to other spatial units (country) in a network will lead to an increase in investment in Europe. GDP a proxy for market size has a positive significant effect (0.17) on FDI and Macroeconomic environment catalyst and total population were insignificant, however, the institution burden, which is an index of the measure of burden of government regulations, business cost of terrorism and business cost of crime and violence and has a significant negative impact on FDI (-0.32). similarly, connectivity has a significant impact on FDI in the European Union with no impact in non-EU countries as shown in table 4.1 below.

This implies that good road infrastructure linkage from a given location to other locations facilitates the flow of FDI into European region. This is visible through the well-structured logistic services linking the coastal region to the hinterland. FDI into Europe is mainly knowledge intensive, majorly Hi-tech consisting of business and financial services; services sector comprising of transportation, warehousing and storage; and manufacturing sector consisting of Engines, turbines and industrial machinery as well as others (FDI Intelligence, 2013; OECD,2014). This finding is in line with Mathivathany, (2015) who asserts that good road networks ensures efficient circulation within and between economies, promotes high connectivity, and provides increased accessibility to locations additionally, Balchin (2000), argues that high level of accessibility is a reflection of low transportation cost within cities thus making it attractive for commercial users such as retail and financial services. This emphasises the importance of connectivity to agglomeration of these sectors in a location and Khanan, (2016) argues that global transportation and other infrastructure networks shape the global economic network. In a similar manner, the market size plays a vital role for retail and service sector. However, the weak government institution and inadequate safety of asset and workers of MNE's Will tend to reduce FDI inflow to Europe. similarly, Alsan et al (2004) indicated that bureaucratic bottlenecks, corruption, crime and violence impede the flow of investment into countries.

Table 4. 1: Connectivity and Total FDI in different sub-regions in Europe

	(EU) logT_FDI	(N-EU) logT_FDI	(E/EUR) logT_FDI	(W/EUR) logT_FDI
connectivity	1.32*	8.83	7.27	0.84
	(0.56)	(15.23)	(6.29)	(0.60)
GCI_MEC	-0.00	0.45***	0.04	0.38*
	(0.14)	(0.10)	(0.13)	(0.17)
logGDP	0.24*	0.14***	0.14	0.20
	(0.10)	(0.04)	(0.09)	(0.12)
total Population	-0.00	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	-0.20	-0.58*	-0.04	-0.47*
	(0.19)	(0.29)	(0.23)	(0.19)
Constant	-0.17	-13.54	-11.09	0.94
	(3.15)	(30.30)	(12.50)	(2.68)
Observations	249	73	142	181
Adjusted R2	67	66	0.48	0.64

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

GCI_MEC = Macro Economic Environment Catalyst Index GCI_InstB = Institutional Burden

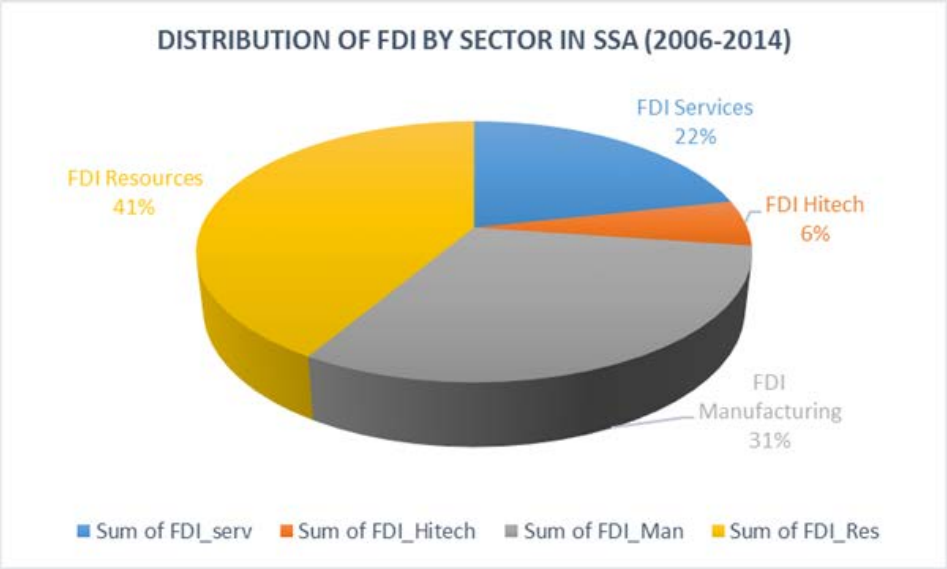
In Africa, the measure of connectivity has no significant impact on the inflow of FDI (Table 4.3, model 5, with 246 observations and R- squared value 0.60. Conversely, at 5% level of significance, Macroeconomic environment catalyst (0.19) which is an index that consists of government budget balance and gross national savings has a significant positive effect. The GDP (0.53) a proxy for market size has a very strong positive impact on the inflow of FDI into Africa at 0.1% level of significance. Contrary to the hypothesis of this research on institutional burden (-0.41) which is an index comprising of government burden, business cost of terrorism violence (summed as lack of safety, insecurity and corruption), and weak institutions have significant positive impact on the inflow of FDI to Africa, while other variables remain insignificant. Furthermore, the effect of an institutional burden on FDI which was initially positive becomes insignificant after considering Regional Economic Community (REC).

This might be in part due to variation in the data series influencing the results (diversity in FDI flows to the different economic community). As a result of the counter-intuitive result obtained, the analysis went further to regions and sub-regions in Africa. Infrastructure network measure of connectivity remained insignificant in both SSA AND Non -SSA. However, in SSA ($R^2 = 0.69$) institution burden has no statistically significant impact on greenfield FDI, while GDP Remained robust with a positive coefficient of (0.47). While in the Non-SSA, other variables have no statistical significance to FDI inflow but the institutional burden has a statistically strong positive impact on FDI with a coefficient of (1.17). This implies that an increase in the level of insecurity and institutional weakness will increase the inflow of FDI to the region.

This could mean that vast volume of FDI to Africa is of the type that is minimally affected by insecurity and violence in the host countries and as shown in chart 4.15 below it is majorly in resources sectors and manufacturing. These sectors which require minimum connectivity of road infrastructure, instead a good highway linking their source of raw material or production factory to the port is more imperative. Globally, insecurity, political risk, terrorism, crime and violence risk leads to a decline in the flow of FDI investment into countries (Aseidu, 2006). These characteristics above classifies a country as fragile and the 2014 World Bank / AfDB, ADB Harmonised List, classified 20 countries fragile which include the countries that attract a substantial amount of FDI in Africa such as Nigeria, Libya and Egypt. Based on Forbes risk map by Nuget (2014) the hotspot in Africa to be vigilant of are: Kenya and Somalia[3] in East Africa; Mali[4] and Nigeria[5] in West Africa; Egypt[6], Tunisia and Libya[7] in North Africa. These countries based on this study with Data from FDI Intelligence (2015) and with the exception of Kenya, Somalia and Mali, attract the largest share of greenfield FDI in Africa to Resource and Manufacturing sectors respectively and these two sectors accounts for about 72% of FDI inflow into Africa as shown in chart 4.15 below.

[3] East Africa due to al-Shabaab terrorist attacks
[4] high profile terrorist attack in the Sahelian region with Al-Qaida affiliates
[5] Islamic extremist attacks of Boko Haram and Niger Delta militancy
[6] Northern Africa with insurgency
[7] Islamist and Militancy groups

Chart 4. 15: Distribution of FDI by Sector in SSA



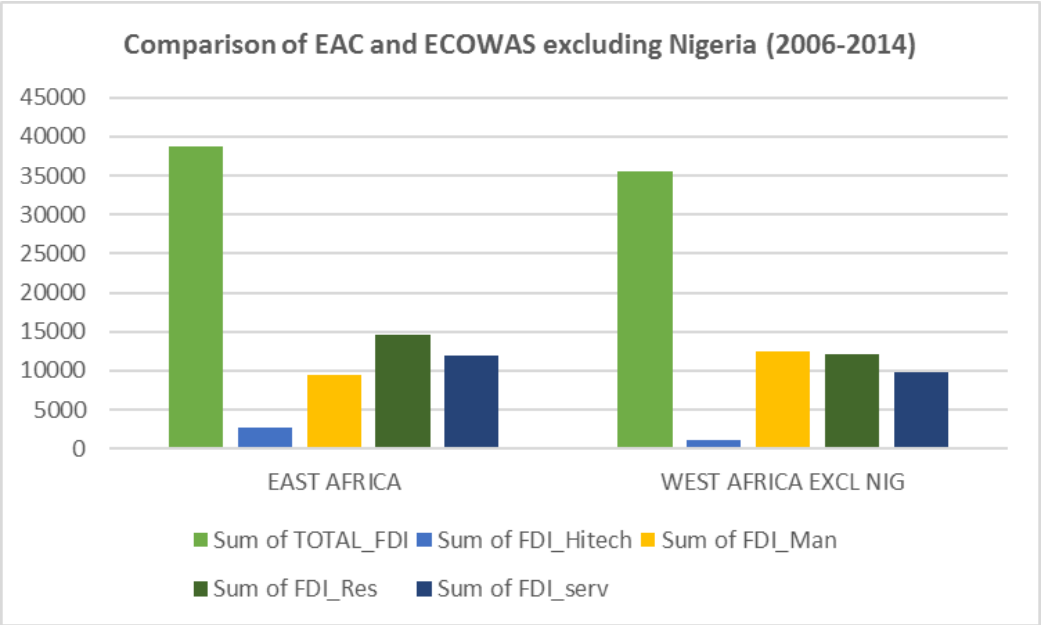
Source: Author,2016; Data Source: FDI Intelligence (2015)

The institutional burden, however, does not deter all investors in the same manner and with the same magnitude, and some investors perform better amidst the turmoil. According to Graham, B. (2012), some MNE's may have the capability to mitigate or manage the type of risk that hinders other investors, thereby creating a monopoly of the market, or they generally invest in projects with high return enough to offset any loss that may arise. Hence, these large investments in fragile countries that outweigh risk involved are generally derived from the natural endowment of the host country and are focused on natural resource extraction and partly agriculture. The resource sector is the largest sector that attracts FDI in sub-Saharan Africa constituting about 41% of the total FDI as shown in Chart 4.15 above. Furthermore, Guidolin and Ferrara (2007) also found evidence that many diamond mining firms benefited immensely from the civil war in Angola since the entry of competing firms was hindered. This can be supported by the increasing share of non-traditional investors from Asia and the pacific in African FDI (FDI market, 2014) and This together with high investment inflow to the resource and support sectors explains why the increase in institution burdens leads to increase in the inflow of FDI. GDP as a proxy for market size, on the other hand, has great significance in attracting FDI in Africa. Furthermore, macroeconomic environment a proxy for macroeconomic stability is a requirement for FDI inflow to Africa.

Considering the effect of Economic Community and location on the flow of FDI into Africa, the Regional Economic Community (REC) is used (Table 4.2 Model 7, R^2 =0.63) as a control, and is found that East African Community (EAC) will attract more greenfield FDI than ECOWAS[8]. As shown in the chart 4.16 with the exclusion of Nigeria in west Africa (which stood out as an outlier and influential factor with exceptionally large amount of FDI), EAC Will attract more FDI than the rest of ECOWAS member states with the exception of the manufacturing sector. This finding can be attributed to the relatively fair distribution of FDI in EAC compared to ECOWAS where Nigeria receives a significant proportion of the FDI.

[8] controlling for influential data with high leverage point and having tendency of distorting the output of the study eliminated some years in Nigeria and other countries

Chart 4. 16: Comparison of FDI inflow to EAC and ECOWAS (Excl. Nigeria- 2006-2014)

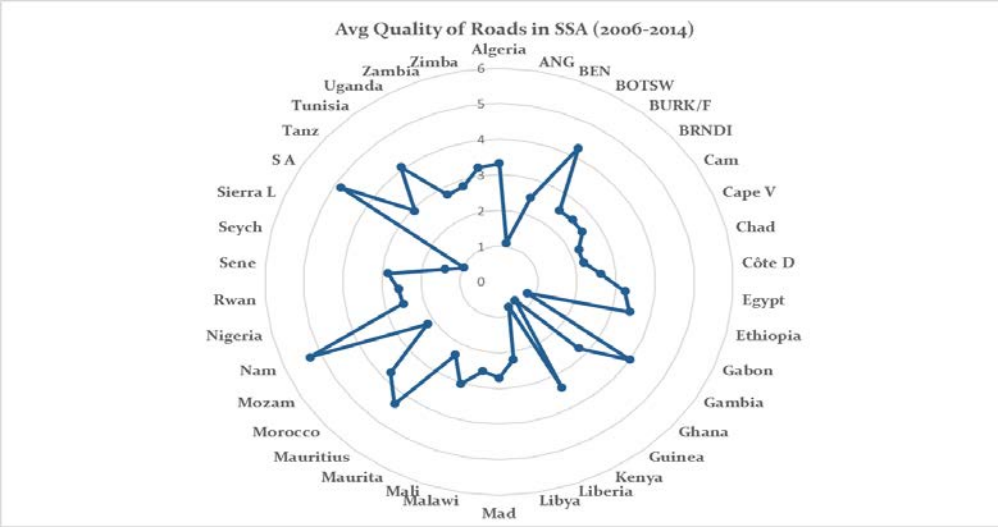


Source: Author,2016; Data Source: FDI Intelligence (2015)

Investigating further, the impact of connectivity became significant at regional level (see table 4.2 below) with connectivity measures in Western Africa (W.A) ($p<0.05$) and Eastern Africa (E.A) ($p<0.001$) having statistical significance whereas in southern and Northern Africa, it has no significance and central Africa was eliminated due to few observations. Additionally, in West Africa institutional burden (0.4) is a significant determinant of FDI and this may be due to the similar reason as discussed above regarding Non -SSA. Since the region shares some similarities in terms of insecurity and natural resource endowment.

These findings imply that Increasing Connectivity in West Africa (74.08) coupled with large market size proxied by GDP and in East Africa (43.27) has a huge impact on FDI inflow in Africa. With the increase in manufacturing FDI in West Africa during the year under review and the growing financial, business and tourism services in East Africa (FDI Market, 2014), connectivity creates accessibility to market for manufactured goods and services in both regions. This is in line with Balchin (2000) and Mathivathany, (2015) who finds accessibility and connectivity of infrastructure in a location significant for FDI, especially in retail and services. Despite massive investment in regional infrastructure projects in East Africa, and relative Investment in West Africa, the two regions are plagued with low quality of infrastructure (average GCI infrastructure rank = 3.12 East Africa, 3.14 West. Africa, between 2006-2014) obtained from the Global Competitiveness Report WEF (2015) most countries ranking below average are located in the West Africa and East Africa sub-region respectively. Whereas countries ranking above average are from southern and Northern Africa as shown in Chart 4.17 below

Chart 4. 17: Quality of Roads in Africa



Source: Author,2016; Data Source: WEF (2015)

The positive significance of institutional burden in west Africa is similar to that of non-sub-Saharan African earlier discussed and the region possesses many similarities to Non-SSA[9]. And north African countries are basically the Non- Sub-Saharan countries. Despite all the insecurity and terrorism crisis over the last eight years, Oil-rich Nigeria accounts for the greater share of FDI into the region (over 70%) with Resources and manufacturing accounting for a significant portion of the FDI.

Table 4. 2: Connectivity and Total FDI in different sub-regions in Africa

	(A) logT_FDI	(SSA) logT_FDI	(N_SSA) logT_FDI	(WA) logT_FDI	(SA) logT_FDI	(NA) logT_FDI	(EA) logT_FDI
connectivity	5.43	2.72	-29.63	74.08*	-9.49	-29.63	43.27***
	(12.45)	(9.56)	(21.64)	(29.10)	(5.43)	(21.64)	(12.14)
GCI_MEC	0.19*	0.08	0.10	0.13	0.04	0.10	-0.20
	(0.10)	(0.12)	(0.24)	(0.31)	(0.17)	(0.24)	(0.36)
logGDP	0.53***	0.53**	-0.43	0.95***	0.14	-0.43	0.36
	(0.15)	(0.17)	(0.44)	(0.16)	(0.20)	(0.44)	(0.30)
Total Population	0.00	0.00	0.00*	-0.00	0.00	0.00*	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	0.41*	0.18	0.97**	0.70**	0.24	0.97**	0.07
	(0.18)	(0.22)	(0.36)	(0.27)	(0.40)	(0.36)	(0.08)
Constant	-20.63	-13.63	71.65	-169.73**	20.15	71.65	-88.52***
	(24.14)	(19.08)	(46.63)	(55.54)	(11.29)	(46.63)	(19.80)
Observations	246	205	41	61	74	41	49
Adjusted R^2	0.60	0.63	0.84	0.83	0.76	0.85	0.84

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
GCI_MEC = Macro Economic Environment Catalyst Index GCI_InstB = Institutional Burden

4.3.2 Integration and greenfield FDI

The integration measure, which calculates how close the origin space is to all other spaces in the network, is a negative, statistically significant determinant of FDI in Europe with a coefficient of (-5.39) as shown in Annex 2, Table 2.4 model 5 (323 observations and R- squared value of 0.65). The market size proxied by GDP (0.19) is also a positive statistically significant determinant of FDI inflow whereas institutional burden (-0.31) is a negative statistically significant determinant of FDI in Europe. However, after controlling for Regional Economic Integration (REC) (Model 8, R^2=0.63), The

[9] Resource rich countries with insecurities like Nigeria, Liberia, Cote-devoir,

institutional burden became insignificant. This REC[10]. This implies that the effect of the institution on countries in the European union may differ with that of the non-European union. In that safety and security risk may have no significant effect on FDI inflow to a particular economic community.

With further analysis based on REC as shown in Table 4.3 below, it is found in Europe, the integration measure is only significant to EU states and macroeconomic stability and institution burden is significant only to Non-EU states whereas market size and is significant in both REC. However, considering the two sub-regions, it shows that integration measure is significant in both sub-regions but institutional burden became insignificant. This implies that infrastructure network is important in both western and eastern Europe. Thus, infrastructure network only increases the flow of FDI into EU member states in both regions. This may be attributed to the massive multimodal transport infrastructure project embarked upon by the EU. However, for the non-EU states large market size and stable macroeconomic environment and good institutions in the form of the reduced institutional burden is the major determinant of FDI. Additionally, both regions are sensitive to market size. These findings show that infrastructure network coupled with good Economic integration, stable macroeconomic environment and a minimal institutional burden is necessary for the member states of the EU from Eastern Europe.

Table 4. 3: Integration and Total FDI in European Regions and REC

	(EUR) logT_FDI	(W/E) logT_FDI	(E/E) logT_FDI	(EU) logT_FDI	(N-EU) logT_FDI
Integration	-5.39*	-3.65**	-33.26**	-4.98*	-49.27
	(2.54)	(1.33)	(10.16)	(2.26)	(48.35)
GCI_MEC	0.24	0.07	0.41*	0.02	0.62***
	(0.14)	(0.13)	(0.17)	(0.15)	(0.14)
LogGDP	0.18**	0.16	0.22	0.26*	0.16**
	(0.06)	(0.10)	(0.12)	(0.10)	(0.06)
Total Population	-0.00	0.00	-0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	-0.31*	-0.09	-0.36	-0.21	-0.59**
	(0.16)	(0.28)	(0.19)	(0.20)	(0.22)
Constant	3.40*	3.98	2.43	2.18	3.95*
	(1.71)	(3.32)	(2.76)	(3.14)	(1.62)
Observations	323	142	181	249	73
Adjusted R^2	0.65	0.61	0.59	0.67	0.84

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

GCI_MEC = Macro Economic Environment Catalyst Index GCI_InstB = Institutional Burden

Further analysis on sub-regional level showed that integration measure of infrastructure network is significant in both Western and Eastern Europe such that a unit increase in segregation or movement from the integrated area will result in a decline of FDI by 3.6% in Western Europe and by 33.3% in Eastern Europe. However, the impact is higher in the eastern Europe, macroeconomic environment catalyst was also significant. The significance of integration or closeness measures of infrastructure network implies that for countries in Europe, being close to each other and the intended market, as well as high accessibility, is paramount for FDI attraction. and locations within close proximity facilitate interaction and exchange between firms and with their existing and potential market, especially in retail and services.

Explicitly, increase in steps further away from the integrated location will lead to a decline in FDI, since integration measures the shortest distance from any space of origin within the network to all other spaces. The more segregated (less integrated) a country, the lower its ability to attract FDI and firms loses the benefit of agglomeration which includes, matching, pairing, and sharing of capital, technology, as well as skills (Fung, et al., 2009). Additionally, the tendency of the country becoming a possible destination especially for service FDI diminishes. Hence, the integration measures of infrastructure network in a given location increases economic integration by attracting investors, and since most retail activities and MNE's headquarters are located on most integrated streets (Hillier, 2009), then retail activities and services may as well be located in countries with high integration measures.

[10] Regional Economic Community in Europe consist of countries in the European Union (EU) and Non-EU.

In Africa, with 246 observations and R^2 value of 0.67 (model 8, ANNEX 2 Table 2.5), the integration measure (-4.16) is a negative statistically strong significant determinant of FDI ($p<0.01$) with less effect than Europe (-5.39,) and GDP (0.53) a proxy for market size is statistically significant for FDI. However, institutional burden (0.44) is a significant positive determinant of FDI in Africa and after considering REC. Firstly, after considering strategic location, the effect of integration measure increases (-8.35) and institutional burden (0.41) was robust with a negative significance on FDI inflow (ANNEX 2 Table 2.5 model 8). This consideration shows the importance of strategic location and REC to the infrastructure network. This may suggest that with good REC, and being strategically placed, the benefits and externalities of the integration measure of road transport infrastructure will be maximized as seen by countries in coastal regions attracting more investment (0.85) than countries that are landlocked and countries in Southern Africa Development Community (SADC) and the Eastern Africa Community (EAC) will tend to attract more greenfield FDI than countries belonging to ECOWAS by 1.13% and 0.99% respectively. However, landlocked countries with weak REC hinders infrastructure provisioning and this may result in segregation of a location from other locations. This location disadvantage may reduce FDI inflow by 8.5% in Africa

This implies that the further a location is in a country or city, the less accessible it becomes and the less investment it attracts. According to Deichmann (1997), the more accessible location in cities enhance the efficiency of enterprise and accessibility enhances the potential for contacts or interaction within the location of economic activities. This implies that as proximity increases enterprise tends to reap the benefit of economies of scales.

Furthermore, some Regional Economic Communities (REC) outperform others in their bid of attracting FDI and in general these two REC are making deliberate efforts to attract FDI into their countries through strong Regional Integration (R.I). EAC is ranked as the top performer on R.I overall while SADC (with regard to Regional infrastructure; Free movement of people; Financial and macroeconomic integration) and ECOWAS (with regards to Free movement of people; Financial and macroeconomic integration) are ranked higher than average in the African Regional Integration Index (African Development Bank Group, 2016). The index consists of five dimensions[11]. Additionally, according to the OECD international direct investment statistics (2014) Only in two (REC) initiatives does intra-group FDI constitute a significant portion of intra-African investments. They are EAC[12] with about 0.5% half, SADC[13]with more than 0.9%. This implies that good REC initiative can significantly increase FDI.

Considering SSA and non-SSA differently, further analysis was carried out and integration measure is a strong negative determinant of FDI to SSA and the institution burden is insignificant however in the integration measure was insignificant in the non-SSA sub-region but the institution burden has a very strong positive significance to FDI inflow into the region.

This finding for Europe shows the importance of infrastructure network, Regional Economic Community, and large market size in EU member states whereas FDI to non-EU member states is sensitive to macroeconomic stability, large market size and good institutions. Conversely, in Africa, infrastructure network and large market size is a determinant of FDI to SSA and in non-SSA, Institution burden and labour force are the determinant.

4 3.3 Choice and Greenfield FDI

The choice measure determines the propensity of a given location being through to all destinations. It is the likelihood of a certain space (location) to be used more often as a route between origin and destination. This measure determines the extent to which a location can function as a link to other locations. And it is a measure of the number of the shortest paths in the network(Hillier,2009).

The measure of choice is not a significant determinant of FDI in Europe and to both Eastern and Western Europe. However, GDP, a proxy for market size is a determinant in the whole of Europe and EU

[11] Trade integration; Productive integration; Financial and macroeconomic integration; Regional infrastructure; and Free movement of people

[12] East African Community

[13] South African Development Community

member states but not in Non-EU member states. As earlier found out, the institutional burden is a negative determinant in the whole of Europe but after disaggregating, it determines the flow of FDI only in Eastern Europe. This finding shows that European countries are not affected by the ability of a location to be an important path for through movement. This finding may be associated with knowledge intensive sector and manufacturing being more affected by proximity to each other and market (integration) and its linkages with other and market(connectivity) as well as the good linkages within the region that enable efficient movement from one location to another with minimal need for intermediacy.

In Africa, the choice measure is a negative, statistically significant determinant of FDI with minimal impact compared with the other accessibility measures a coefficient of (0.00) as shown in ANNEX 2 Table 2.5 model 5 (246 observations and R- squared value of 0.62). The market size proxied by GDP (0.55) is also a very strong positive statistically significant determinant of FDI inflow with significant impact whereas institutional burden (0.40) is a positive statistically significant determinant of FDI in Africa. However, after controlling for Regional Economic Integration (Model 7, R2=0.64), The Macroeconomic Environment Catalyst (MEC) a proxy for macroeconomic stability became significant and institutional burden became insignificant. This implies that an increase in steps away from the shortest location within the network relative to all locations minimally reduces the flow of FDI and the presence of strong stable macroeconomic environment reduces or eliminates the institution burden as seen in the work of Aseidu (2006). Further analysis segregated SSA and Non- SSA and the choice measure of accessibility is a negative significant determinant of FDI to SSA and insignificant to FDI in non-SSA and GDP remained robust in SSA while having no significance in Non-SSA. However, the institution burden lost its significance in SSA and remained robust in non-SSA.

Considering the various sub-regions as shown in table 4.4 below, the choice measure is strong determinant with minimum impact in both Western and Eastern Africa but has no significance in both Southern and Northern Africa. While GDP a proxy for Market size remained insignificant in all the regions except Western Africa. This implies that with large market size in West Africa and teeming potentials for FDI attraction in both W.A and E.A, improving their infrastructure network will reduce the distance between locations and enhance their tendency of becoming significant hubs for FDI in Africa. These findings suggest that for a continent like Africa with peculiar geography, the availability of countries with a good network of road infrastructure and betweenness (choice) is essential for attracting FDI since these countries may serve as FDI hubs for the region.

Table 4. 4: Choice measure and total FDI to regions in Africa

Dependent Var: Log Total FD	**(AFR) logT_FDI**	**(SSA) logT_FDI**	**(N-SSA) logT_FDI**	**(WA) logT_FDI**	**(SA) logT_FDI**	**(NA) logT_FDI**	**(EA) logT_FDI**
choiceN	-0.00***	-0.00**	-0.00	-0.00**	0.00	-0.00	-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC	0.19	0.08	0.08	0.20	-0.01	0.08	-0.16
	(0.10)	(0.13)	(0.20)	(0.32)	(0.21)	(0.20)	(0.35)
logGDP	0.55***	0.54**	-0.50	1.15***	0.11	-0.50	0.38
	(0.15)	(0.17)	(0.60)	(0.21)	(0.17)	(0.60)	(0.26)
Total Population	0.00	0.00	0.00	-0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	0.40*	0.17	1.04*	0.64	0.21	1.04*	0.04
	(0.18)	(0.22)	(0.46)	(0.41)	(0.40)	(0.46)	(0.16)
Constant	-9.99**	-8.35*	13.76	-25.28***	1.74	13.76	-1.70
	(3.32)	(4.07)	(12.83)	(6.17)	(2.90)	(12.83)	(5.31)
Observations	246	205	41	61	74	41	49
Adjusted R^2	0.62	0.64	0.84	0.82	0.68	0.84	0.87

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
GCI_MEC = Macro Economic Environment Catalyst Index GCI_InstB = Institutional Burden

4.3.4 Summary of Findings

This study found that infrastructure network influences the flow of FDI in Europe differently from Africa and it further showed the sub-regional differences within a given region. From this study, it can be said that in Europe, connectivity and integration measures of infrastructure network greatly

determine the inflow of FDI. This is in line with Omer and Goldblatt (2015), who argues that locations with high connectivity values have higher integration values and these locations determine the distribution of retail and service sector activities. Thus, Increasing connectivity will increase FDI in Europe by 1.3% and increasing segregation (reducing integration) declines FDI inflow by 5.4% in Europe. While choice and strategic locations (coastal or landlocked) remained insignificant. Similarly, Kumar, (2001) posited that the geographical distance between the home and the host country has a negative effect on FDI and Ndulu (2006) argues that distance reduces the capacities of countries to attract investment. In western Europe integration measure of infrastructure network along with market size are significant determinant of FDI and the significance of market size can be associated with market seeking FDI as supported by Dunning (2001), similarly, Pandya (2010), states that Market-oriented or seeking FDI locate their MNE's and production facilities in countries with potential market size.

While in Eastern Europe the integration measure of infrastructure network has a Larger impact on FDI, it implies movement away from integrated location reduces FDI by 33%. Similarly, increasing institutional burden reduces FDI by 0.3%. furthermore, with other significant indicators such as market size, macroeconomic stability, labour force and institution burden, it Indicates the tendency that significant proportion of FDI in Western Europe may be efficiency seeking aimed at lower transaction and input cost (Dunning, 2001). Pandya (2010) also states that Firms reduce production costs by embarking on export-oriented or efficiency seeking FDI and relocate production units to locations with reduced production cost such as labour and input resources like raw materials. The insignificance of choice measure of infrastructure networks in both Eastern and Western Europe may be a subject for further research.

On the other hand, connectivity measure of network infrastructure is not significant to FDI inflow to both SSA and non-SSA respectively, but on the sub-regional level, West Africa and East Africa are sensitive to connectivity with high elasticities of (West Africa=74.1) and (East Africa=43.3). furthermore, as segregation (reduction of integration due to an increase of distance) increase, the inflow of FDI to Africa declined by 4.16% while the choice measure has a minimal but significant impact on FDI. The market size is also significant in Africa and SSA and being located in the coastal region attract more FDI by about 0.85% than locations in the landlocked regions and the REC of southern Africa (SADC) will attract 1.13% and East African Community (EAC), will attract 0.99% more FDI than ECOWAS of the Western region, indicating some the REC outperform others in FDI attraction due to good policies and initiatives such as intra-African Investment initiative, amounting to about 50% increase of investment in EAC and 90% increase in SADC (UNCTAD[14],2014.); Regional Indicative Strategic Development Plan (RISDP) of SADC (SADC,2011) which outlines factors considered by investors when evaluating a region's suitability for investment; as well as the East African community (EAC) Common Market Protocol (Njeku and Njeri,2012). However, all network measures remained insignificant in Non-SSA while institutional burden and labour force were significant. This peculiarity of North Africa regarding infrastructure network may be attributed to insufficient road transport infrastructure network which may be due to higher cost of construction as a result of vast desert terrain, furthermore it could also be as a result of the type and nature of primary and manufacturing (non-consumer product automobile assembly, machine and heavy equipment, ICT and electronics) sector activities as well as that of hi-tech and services (such as pharmaceuticals, and chemical, insurance and financial intermediation and real estate)which requires less connected and integrated road infrastructure network than services and Hitech. This in line with findings of Porta et al (2012) for Barcelona, who argued that Primary activities and services such as such as R&D, IT activities, insurance and financial intermediation, fix and maintenance of motor vehicles, rent and sales of machines and heavy equipment are not sensitive to road infrastructure

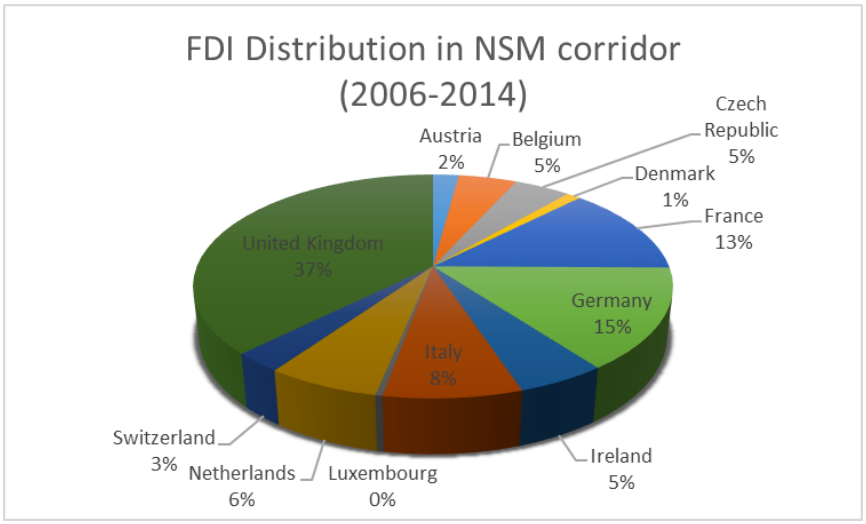
[14] United Nations Conference on Trade and Development,

4.4 Descriptive Analysis of FDI in The NS-M and L-A Corridor

4.4.1 FDI in NS-M Corridor

The NSM corridor attracted a total sum of $942364.2bn between 2006-2014 accounting for about 33% of the total FDI to Europe. FDI inflow is distributed within the corridor with United Kingdom (37%) as the highest recipient and Luxembourg accounting for less than 1% as shown in chart 4.18 below.

Chart 4. 18: FDI Distribution in NSM corridor from 2006 -2014.

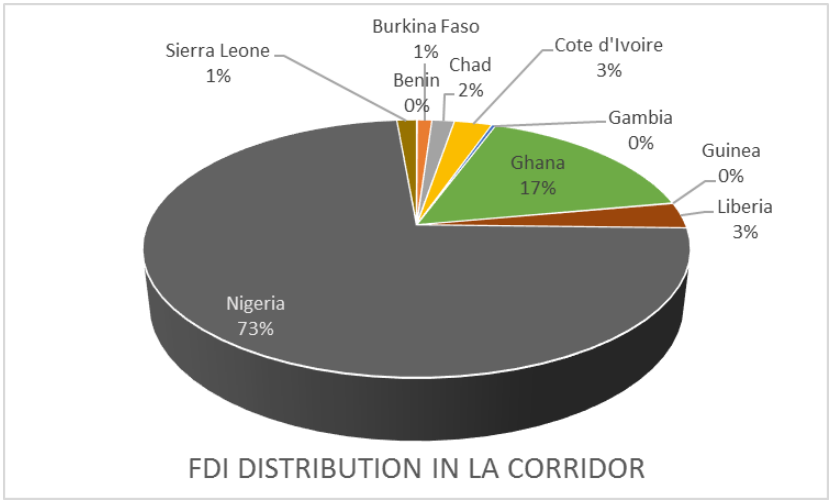


Source: Author,2016; Data Source: FDI Intelligence (2015)

4.4.2 FDI in L-A corridor

The L-A corridor received a total sum of $114526.67bn accounting for about 16% % of the total FDI to Africa, with Nigeria (73%) attracting the largest investment and Benin, Guinea and Gambia attracting less than 1% each as shown in chart 4.19 below. The manufacturing sector (37%) and resources sector (36%) account for the most of the FDI inflow in LA corridor.

Chart 4. 19: FDI Distribution in L-A corridor from 2006 -2014



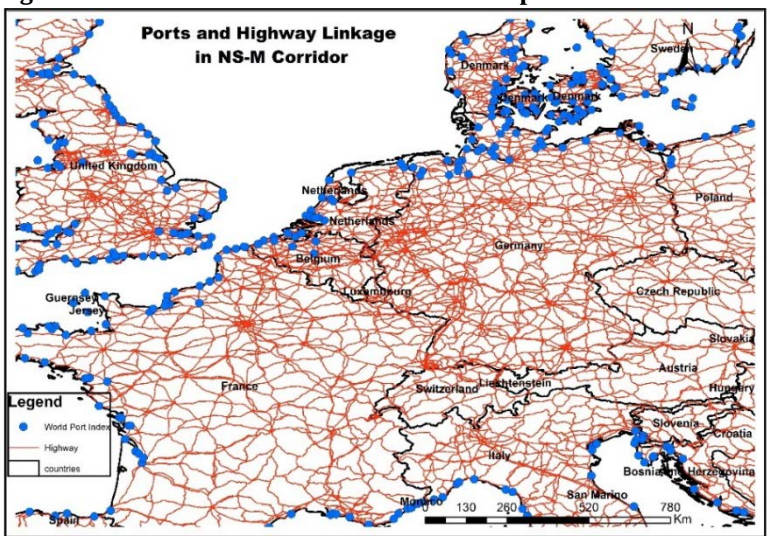
Source: Author,2016; Data Source: FDI Intelligence (2015)

4.5 Descriptive Analysis of Infrastructure Network in NS-M and L-A Corridor

4.5.1 Infrastructure Networks in the NSM corridor

The corridor ranks high in infrastructure index catalyst without ICT derived from GCI/GCR. With an average index of 6.39 and Netherlands ranking highest with 7.40 and Italy, the least with 4.65. The road network is dense and highly connected as shown in figure 4.6 this is in accordance with the space syntax analysis where Netherland is the most connected with a measure of 2.16, Italy the least with a measure of 2.06.

Figure 4. 4: Distribution of road network and port in NSM corridor

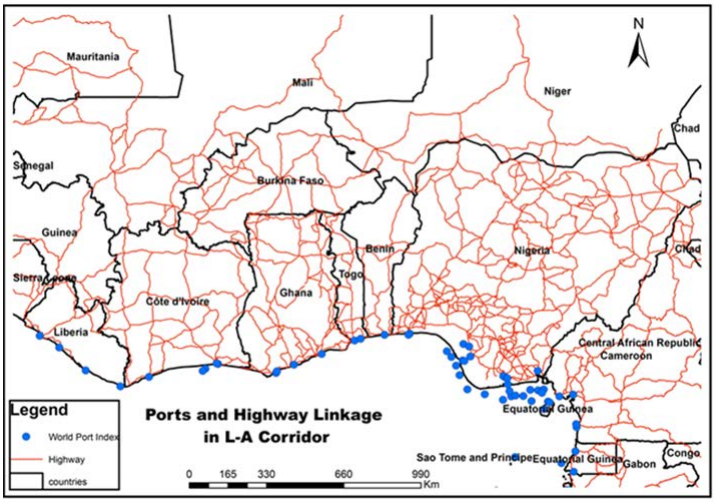


Source: Author,2016. Data source: ESRI, 2016

4.5.2 Infrastructure Network in the L-A corridor

Countries in the L-A corridor are characterised by low quality and quantity of various infrastructure (Foster and Briceño-Garmendia, 2010). They rank low in quality of infrastructure based on Global Competitiveness Index (GCI) ranking, with cote d'Ivoire (4.48) ranking higher and slightly above the least in the NSM corridor WEF (2015). The average connectivity measure in the LA corridor is 2.02, with Nigeria and Ghana ranking above average with 2.03 and the road network is sparse compared with NS-M corridor with some missing links as shown in figure 4.7 below. This suggests that despite being the dense corridor in terms of networks of road, the quality of road infrastructure remain low in L-A corridor. Therefore, corridor approach to improving the quality of road need to be adopted and the road network to need to link the trans-Saharan corridors to the coastal corridors as this will enhance trade, reduce transition cost and increase integration, hence increase FDI inflow to the hinterland.

Figure 4. 5: **Distribution of road network and port in LA corridor**



source: Author,2016. Data Source: ESRI, 2016

Q1b Does infrastructure network determine the inflow of FDI into NS-M and L-A Corridor?

4.6 Inferential Analysis of Infrastructure Network and Greenfield FDI in L-A Corridor and NS-M corridor

4.6.1Connectivity and FDI

From table 4.5 below, with 99 observations and R^2 value of 0.81, connectivity measure is a significant determinant of FDI inflow to NS-M corridor with an effect of (1.75) in model 5 GDP (0.31) proxy for market size and total population a proxy for labour force are likewise significant determinant of FDI in NS-M corridor. This implies that connectivity of road infrastructure become an important factor for attracting FDI as it interacts with population and institution. This interaction of infrastructure, market size and labour for shows that the corridor is capable of attracting both market seeking and efficiency seeking FDI. And according to OECD (2015) countries along this corridor especially UK, France, Germany, Netherlands attract FDI into services (financial, retail, transport and logistics etc.) and manufacturing sector respectively. Decades ago, Rietveld, (1989) argued that manufacturing economies are attracted by the good connectivity of transportation infrastructure networks for movement of goods, people and it is still valid. This further buttress the work of Omer and Goldblatt (2015), who posits that locations with high connectivity define the spread of retail and service sector activities. This corridor may also have the capability of attracting capabilities-seeking FDI Since the NS-M corridor attract knowledge intensive FDI's in chemicals, Research and Development and into manufacturing sector consisting of Engines, turbines and industrial machinery (FDI Intelligence, 2013). This may explain why connectivity needs to interact with other factors to yield a significant impact in the corridor. Connectivity is of the essence in this corridor being an influential corridor linking two coastal regions to the hinterland.

Table 4. 5: Connectivity Measure and Total FDI to NS-M

NS-M	(1) logT_FDI	(2) logT_FDI	(3) logT_FDI	(4) logT_FDI	(5) logT_FDI
connectivity	1.65	1.63	1.54	1.70*	1.75*
	(1.47)	(1.44)	(0.90)	(0.75)	(0.78)
GCI_MEC		0.17	0.13	0.15	0.15
		(0.19)	(0.18)	(0.20)	(0.18)
logGDP			0.31*	0.40**	0.38*
			(0.15)	(0.15)	(0.16)
Total Population				0.00**	0.00*
				(0.00)	(0.00)
GCI_InstB					0.18
					(0.14)
Constant	4.35	3.42	-4.37	-7.42	-7.91
	(3.48)	(3.59)	(5.46)	(5.58)	(5.93)
Observations	99	99	99	99	99
Adjusted R2	0.04	0.05	0.79	0.81	0.81

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
GCI_MEC = Macro Economic Environment Catalyst Index GCI_InstB = Institutional Burden

On the other hand, in the L-A corridor in Africa, the scientific significance of connectivity measure is very strong with great impacts to the inflow of FDI. From model 5 in table 4.6 below (R2 =0.82, and observations=49), the magnitude of connectivity (90.2) on FDI becomes slightly lower when other factors are considered. GDP is a significantly robust with a coefficient of 0.81. As a result of heterogeneity of languages in the L-A corridor, the language dummy is considered and model 5 (R2 = 0.92 with 49 observations) shows that French-speaking countries in the L-A corridor attract less FDI than English speaking countries.

Table 4. 6: Connectivity Measure and Total FDI to L-A corridor

L-A	(1) logT_FDI	(2) logT_FDI	(3) logT_FDI	(4) logT_FDI	(5) logT_FDI	(6) logT_FDI
Connectivity	151.76***	142.17***	72.19	75.04	90.24***	41.17
	(39.44)	(38.12)	(43.65)	(42.55)	(23.76)	(29.75)
GCI_MEC		0.20	0.21	0.19	-0.01	-0.06
		(0.23)	(0.22)	(0.24)	(0.23)	(0.12)
logGDP			0.49*	0.46	0.81***	0.90***
			(0.23)	(0.27)	(0.16)	(0.18)
Total Population				0.00	-0.00	-0.00**
				(0.00)	(0.00)	(0.00)
GCI_InstB					0.39	-0.17
					(0.29)	(0.35)
ENGLISH						0.00
						(.)
FRENCH						-1.57***
						(0.34)
Constant	-300.99***	-282.63***	-152.74	-157.85	-197.23***	-96.59
	(79.40)	(76.55)	(84.25)	(81.74)	(45.43)	(56.95)
Observations	65	65	65	65	49	49
Adjusted R^2	0.53	0.54	0.62	0.63	0.82	0.92

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = Institutional Burden

This implies connectivity is essential for attracting FDI in the L-A corridor. This is a premier coastal corridor that links the most economically significant cities and ports in the sub-region with a wide zone of influence in terms of trade and demographics. (African Development Bank Group, 2016). According to Frémont and Franc (2010) Well-developed ports offering a high volume of inland services, and accommodating larger container vessels have higher control of a great proportion of the hinterland. With the large market size and availability of labour force for the MNE's (predominant in the region) the significance of connectivity is lost. However, the presence of institutional burden re-established the significance of connectivity to the corridor. This interaction between connectivity and institutional burden in this model indicates that with an increase in instability in the location, an increase in connectivity offers MNE's a good reason for making investment decisions and this may tend to increase the flow of FDI. Controlling for ethnolinguistic heterogeneity shows that being francophone tend to reduce the chance of FDI attraction in L-A corridor. While most francophone countries with the exception of Mali are small countries with small economies, both coastal landlocked and with minimal natural resources. Therefore, strong Regional Integration and proper infrastructure linkages to larger economies will improve their efficiency and create a strong link with investors, boost trade and investment within the corridor and with other regions and according to the AFDB (2016b)[15], an efficient and well-developed road network will result in a multiplier effect on the flow of investment into Africa. This result suggests the relevance of the connectivity of transportation networks to coastal corridors (both NSM and LA corridors) since they serve as gateways to landlocked countries

Thus a unit increase in connectivity will significantly increase the flow of FDI in the L-A corridor by 90% and will minimally increase FDI flow in the NS- M corridor by 1.75%. this difference could be as a result of saturated road networks and multimodal transportation infrastructure in the corridor.in the NS-M corridor and the serious need for infrastructure investment and high dependence on road transportation along the corridor and Piet, et al., (2010) shows that in Africa, more than 90% of interregional trade is facilitated by road as the main transportation mode.

4.6.2 Integration and FDI

In the NSM corridor, integration measure is robust throughout the models and is a negative statistically significant determinant of FDI with a coefficient of (-3.50) in model 5 of table 4.7 (R2 = 0.74, and 99 0bservations). GDP a proxy for market size and total population a proxy for labour force are positively significant to FDI while institutional burden and Macroeconomic environment catalyst remained insignificant. This suggests the importance of this corridor as close location to other FDI destination

[15]African Development Bank Group

within the network and unit distance movement from corridor has the capacity to reduce the inflow of FDI by 3.5% whereas an increase in labour force and market size is essential for FDI attraction

Table 4. 7: Integration Measure and Total FDI to NS-M corridor

NSM	(1) logT_FDI	(2) logT_FDI	(3) logT_FDI	(4) logT_FDI	(5) logT_FDI
Integration	-4.34*	-4.54*	-4.03**	-3.06*	-3.50**
	(1.94)	(1.92)	(1.30)	(1.22)	(1.19)
GCI_MEC		0.17	0.15	0.16	0.16
		(0.19)	(0.19)	(0.20)	(0.18)
logGDP			0.26*	0.38*	0.35*
			(0.13)	(0.16)	(0.16)
Total Population				0.00*	0.00*
				(0.00)	(0.00)
GCI_InstB					0.20
					(0.14)
Constant	8.08***	7.11***	0.23	-3.02	-3.23
	(0.50)	(1.15)	(3.71)	(4.52)	(4.75)
Observations	99	99	99	99	99
Adjusted R2	0.06	0.07	0.66	0.75	0.74

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = Institutional Burden

In LA corridor, integration (-6.51) is negatively significant to FDI as shown in table 4.8 below (Model 2, R2= 0.27 with 65 observations), however, it loses its significance when GDP, total population and institutional burden are controlled for (model 6, R2 = 0.93, with 49 observations). In this model GDP (1.12) and is positively significant to FDI while total population a proxy for availability of labour force is a negative statistical determinant of FDI and French speaking countries attract less FDI than English speaking countries in the corridor by 1.64%.

Table 4. 8: Integration Measure and Total FDI to L-A corridor

L-A	(1) logT_FDI	(2) logT_FDI	(3) logT_FDI	(4) logT_FDI	(5) logT_FDI	(6) logT_FDI
integrations	-6.73**	-6.51**	0.51	0.63	5.33	1.17
	(2.58)	(2.28)	(3.62)	(3.90)	(2.87)	(2.30)
GCI_MEC		0.41	0.30	0.31	0.10	0.01
		(0.22)	(0.19)	(0.22)	(0.23)	(0.14)
logGDP			0.69*	0.71*	1.22***	1.12***
			(0.28)	(0.34)	(0.25)	(0.21)
Total Population				-0.00	-0.00	-0.00*
				(0.00)	(0.00)	(0.00)
GCI_InstB					0.20	-0.14
					(0.41)	(0.37)
ENGLISH						0.00
						(.)
FRENCH						-1.64***
						(0.24)
Constant	5.41***	3.36**	-12.34	-12.90	-24.75***	-19.19***
	(0.69)	(1.19)	(6.68)	(8.28)	(6.95)	(5.80)
Observations	65	65	65	65	49	49
Adjusted R2	0.09	0.27	0.58	0.58	0.81	0.93

Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001
GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = Institutional Burden

This result implies that integration in LA corridor is significant for FDI attraction and being an investment location (to- movement) requires good macroeconomic stability as shown in model 2 and increasing the quantity of labour force may be detrimental to FDI hence, quality and cost of labour may be more desirable than the quantity of workforce. In addition, considering the major FDI it attracts basically is into the resource sectors and non-extractive manufacturing which are mostly concerned with road networks from the source of raw materials or factory to the ports and outlets, closeness is irrelevant and compared with the NS-M corridor that attracts mostly knowledge based FDI and services. The closeness of one location to the other is paramount for effective interaction and investment flows

4.6.3 Choice and FDI

The infrastructure network measure of choice is a very strong significant negative determinant of FDI in the NS-M corridor with minimal effect (-0.00). Table 4. (model 4, $R^2 = 0.98$ with 44 observations). Market size and labour force plays a significant role also in the corridor. This may suggest the relative importance of the NS-M corridor as a through movement for other location, being one of the significant corridors that constitute some of the busiest port in Europe like the port of Rotterdam, port of Amsterdam, Port of Antwerp and the Port of Maisel (TENtec Reporting, 2014), serving as an entrée-port in Europe with good transport and logistics services.

Table 4. 9: Choice Measure and Total FDI to NS-M corridor

NS-M	(1) logT_FDI	(2) logT_FDI	(3) logT_FDI	(4) logT_FDI	(5) logT_FDI
ChoiceN	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC		0.10	0.03	0.00	0.01
		(0.13)	(0.08)	(0.08)	(0.10)
logGDP			0.31***	0.27***	0.26***
			(0.03)	(0.02)	(0.03)
Total Population				0.00***	0.00***
				(0.00)	(0.00)
GCI_InstC					-0.04
					(0.04)
Constant	9.23***	8.67***	0.34	1.42*	2.16*
	(0.26)	(0.63)	(0.72)	(0.60)	(1.08)
Observations	44	44	44	44	44
Adjusted R2	0.039	0.43	0.98	0.98	0.98

Standard errors in parentheses $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = institutional burden

In LA corridor, choice measure (-0.00) is a very strong negative significant determinant of FDI although with minimal effect table 4.10 below (Model 5, R2= 0.80 with 49 observations), and GDP (0.14) a proxy for market size is a positive significant determinant of FDI inflow

Table 4. 10: Choice measure and Total FDI to L-A corridor

L-A	**(1) logT_FDI**	**(2) logT_FDI**	**(3) logT_FDI**	**(4) logT_FDI**	**(5) logT_FDI**
choiceN	-0.00	-0.00	-0.00**	-0.00**	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC		0.42	0.30	0.32	0.17
		(0.22)	(0.19)	(0.22)	(0.22)
logGDP			0.69***	0.71**	1.12***
			(0.20)	(0.25)	(0.21)
Total Population				-0.00	-0.00
				(0.00)	(0.00)
GCI_InstB					0.47
					(0.38)
Constant	5.21***	3.14**	-12.21*	-12.72*	-23.33***
	(0.66)	(1.13)	(4.81)	(6.09)	(6.47)
Observations	65	65	65	65	49
Adjusted R2	0.02	0.28	0.62	0.61	0.80

Standard errors in parentheses
$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$
GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = institutional burden

This finding implies that Choice (betweenness measure which refers to the propensity for through movement) is significant for FDI in the corridor with minimal impact. This shows that locations with high betweenness may not necessarily attract a substantial amount of FDI, but will serve as a route for other locations within the corridor. And in view of diversification of economies this shows that despite the active resource based FDI, the corridor has a strong potential for attracting retail service sector as supported by Omer and Goldblatt (2015) who found a strong correlation between retail activities and areas with high choice and integration.

4.6.4. Summary of Findings

This finding shows that infrastructure network is a strong determinant of FDI inflow into NSM corridor with significant impact on all the three measures of infrastructure measures (connectivity, integration and choice) and the robustness was checked at the various radius and it remained significant. Increasing connectivity in NS-M corridor will increase FDI BY 1.75%, an increase in the integration measure

implies an increase in distance from the most integrated location leads to segregation and has a negative effect on FDI. As segregation increases, FDI declined by 3.5% and as the propensity of through movement reduces through an increase in steps (Choice), FDI declines significantly with minimal effect. This finding shows the significance of the NS-M corridor as a preferred location for investment (degree centrality or connectivity), a location with brokerage capacity (closeness or integration) and a location with a high propensity for through movement of FDI (betweenness or choice). This together with market size that increases the propensity for profitability and teeming labour force are a necessity for increase inflow of FDI to the corridor as it stands as the gateway to eastern Europe and the entire European continent. This could be due to a regional approach in EU regarding the provision of infrastructure and according to Kuroda (2016) physical connectivity through the development of cross-border infrastructure is vital for enhanced regional economic integration. This REI enhances the flow of FDI to the regions

similarly, in L-A corridor, the infrastructure measure of connectivity was robust with higher impact than NSM corridor. This implies that a unit increase in connectivity will increase FDI by almost a hundred percent (90.2%) and this indicates its importance as a preferred location for FDI, whereas the measures of integration and choice were significant however not robust. Since it loses its significance when other factors are considered and when analysed at the various radius.

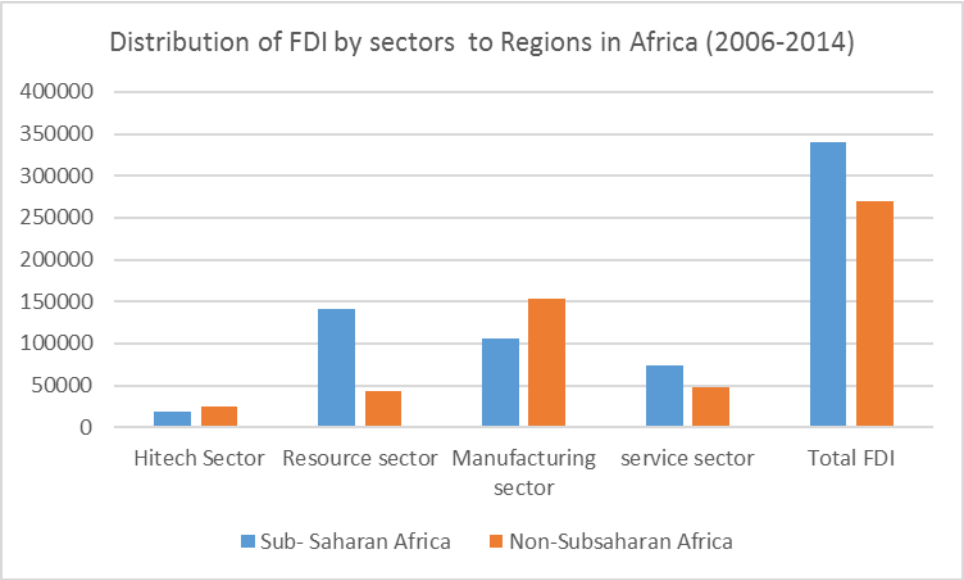
These findings show the significance of the corridors as a location for investment since FDI is attracted to locations that are connected with other locations as argued by Rietveld (1989) who found out that interregional trade flows and manufacturing economies are attracted by the good connectivity of transportation infrastructure networks. And Omer and Goldblatt (2015) found retail and services attracted to areas with good accessibility. However, as a coastal corridor, its ability to feature as an intermediary (between location or choice) and accessible (integrated or close) location for FDI into Africa is minimal. This may be due to Diverse and counterproductive Macro-Economic policies and institutions of the countries along the corridor such as conflicting initiatives on common currency and monetary cooperation policies of WAEMU and ECOWAS in West African Sub-region (Masson and Pattillo,2004), diverse Regional Trade Agreements (RTA'S) within ECOWAS member states belonging to either francophone dominated West African Economic and Monetary Union (WAEMU) or Anglophone-dominated West African Monetary Zone (WAMZ) as shown by Olofin et al (2014). Additionally, there is also diversity in tax coordination and revenue mobilisation policies as shown by Mansour and Rota-Graziosi (2013). Furthermore, these inadequacies could contribute to the inadequate linkages of good quality transportation infrastructure between the coastal region and hinterland within the corridor. This study, therefore, states that infrastructure network is a significant determinant of FDI in NS-M corridor and the L-A corridor

4.7 Descriptive Analysis of FDI and Infrastructure to Various Sectors (Hitech, Service, Manufacturing, and Resources) in Africa

4.7.1 Descriptive Analysis of FDI into Sectors in Africa

In this studies, Africa in general, consisting of 40 countries attracted an FDI inflow of $609414bn of which 43% is to the manufacturing sector 20 % to the services sector, 30% to the resources sector and 7% to the Hi-tech sector from 2006 to 2014. Africa has many peculiarities, in addition to peculiar geography, there is also a peculiar flow of FDI into sub-Saharan and non-sub-Saharan Africa. Consequently, the two regions in Africa attracted FDI differently within the same period under review as shown in chart 4.20 below, with sub-Saharan Africa consisting of 34 countries, attracting a Sum of total FDI of $339554.739bn and resource sector accounts for 41%, manufacturing (31%), service (22%), and Hitech (7%). Conversely, the Non- sub-Saharan region consisting of 5 countries attracted a sum of total FDI of $2698860.11bn and the manufacturing sector accounts for 57%, resource (16%), services (18%), and Hitech (9%)

Chart 4. 20: **Distribution of FDI by Sectors and Regions in Africa**



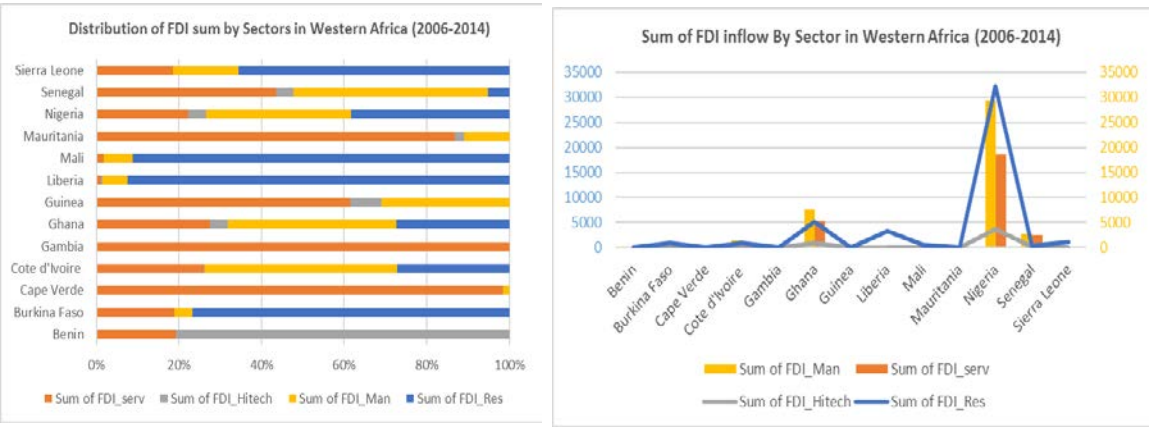
Source: Author,2016; Data Source: FDI Intelligence (2015)

4.7.1.1 FDI inflow by region into Africa

Western Africa and Sector FDI

The distribution of FDI into West African Sub-region is highly skewed. This skewness is in terms of the concentration of FD inflow in some few countries while others attract minimal value. Nigeria is the leading destination for FDI to all sector with the maximum investment in resources and manufacturing and the least in Hi-tech. other performing countries are Ghana (manufacturing, services and resources, Liberia (resource) and Senegal (manufacturing and services) as shown in chart 4.21 below.

Chart 4. 21: Distribution of FDI by Sectors in Western Africa

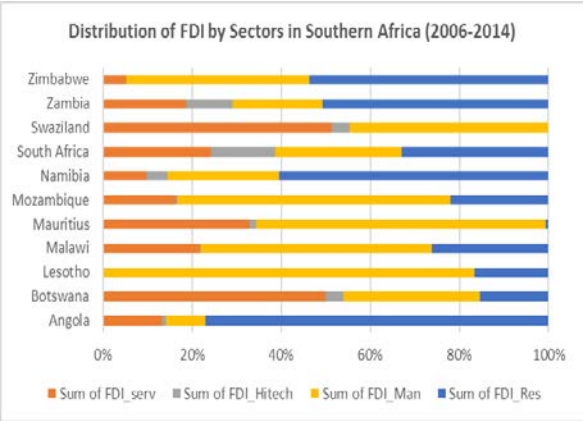


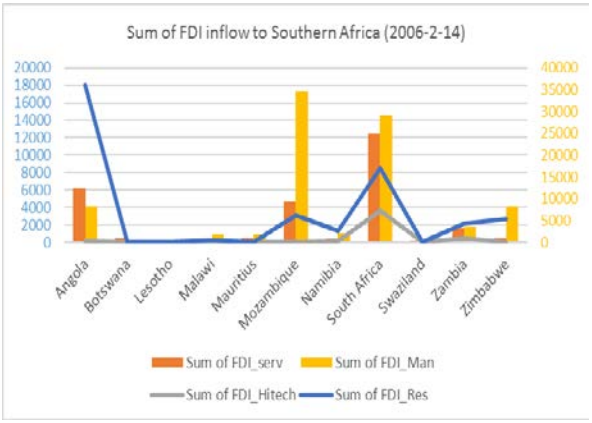
Source: Author,2016; Data Source: FDI Intelligence (2015)

Southern Africa and sector FDI

In southern Africa, FDI inflow is distributed among some key countries with south Africa attracting a significant proportion of FDI into all the four sectors and the largest recipient of service sector FDI, Angola the largest recipient of FDI to the resources sector and Mozambique the largest recipient of manufacturing FDI. Other countries in the region equally attracted some amount of FDI to various sectors as shown in chart 4.22 below.

Chart 4. 22: Distribution of FDI by Sectors in Southern Africa



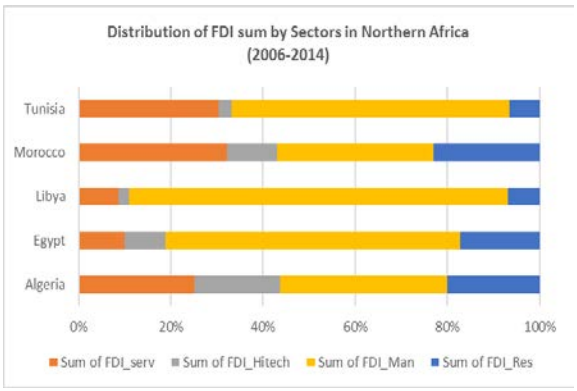


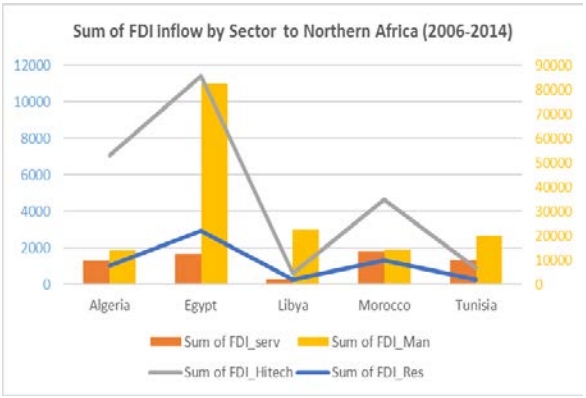
Source: Author,2016; Data Source: FDI Intelligence (2015)

Northern Africa and sector FDI

The distribution of greenfield FDI in Northern Africa proportionately cuts across all countries with Egypt attracting the largest in all sectors and Algeria 2nd largest attractor of resource sector FDI, Libya and Tunisia the 2nd and 3rd largest attractors of manufacturing FDI, while Morocco is the largest attractor of service FDI and the 2nd largest attractor of Hitech FDI as shown in chart 4.23 below.

Chart 4. 23: Distribution of FDI by Sectors in Northern Africa



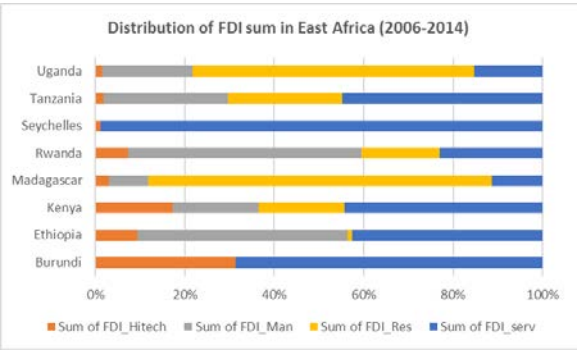


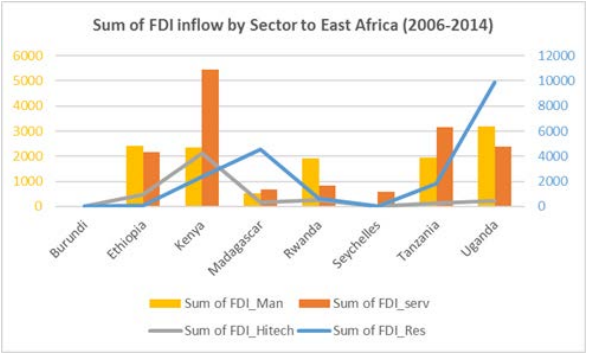
source: Author,2016; Data Source: FDI Intelligence (2015)

Eastern Africa and sector FDI

All countries in the East African Sub-region attract some amount of FDI to various Sectors as shown in chart 4.24. With Kenya attracting larger investment to services, manufacturing and Hi-tech sectors respectively. Similarly, Uganda attracts a significant proportion of FDI to the resources sector followed by Madagascar, whereas Tanzania and Ethiopia are the second largest attractors of service and Hi-tech FDI. This fair distribution of FDI amongst member states is an indication of the strong intra-regional alliance.

Chart 4. 24: Distribution of FDI by Sectors in Eastern Africa



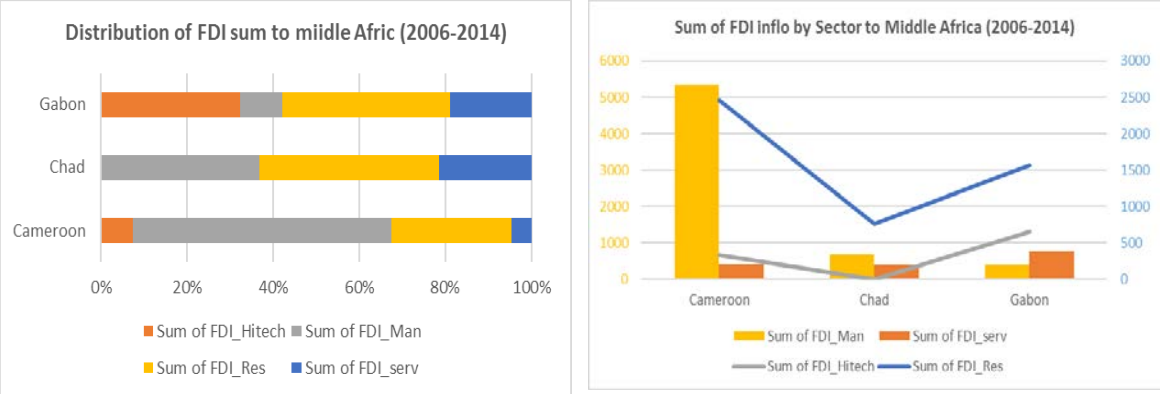


Source: Author,2016; Data Source: FDI Intelligence (2015)

Middle (Central) Africa and sector FDI

This sub-region attracts the least amount of FDI compared to other sub-regions with the manufacturing and resource sector as the highest recipient of FDI domiciled in Cameron and Gabon attracting the largest investment in Hitech and services as shown in chart 2.25 below.

Chart 4. 25: Distribution of FDI by Sectors in Central Africa



Source: Author,2016; Data Source: FDI Intelligence (2015

4.7.2 Descriptive Analysis of Infrastructure Network in Africa

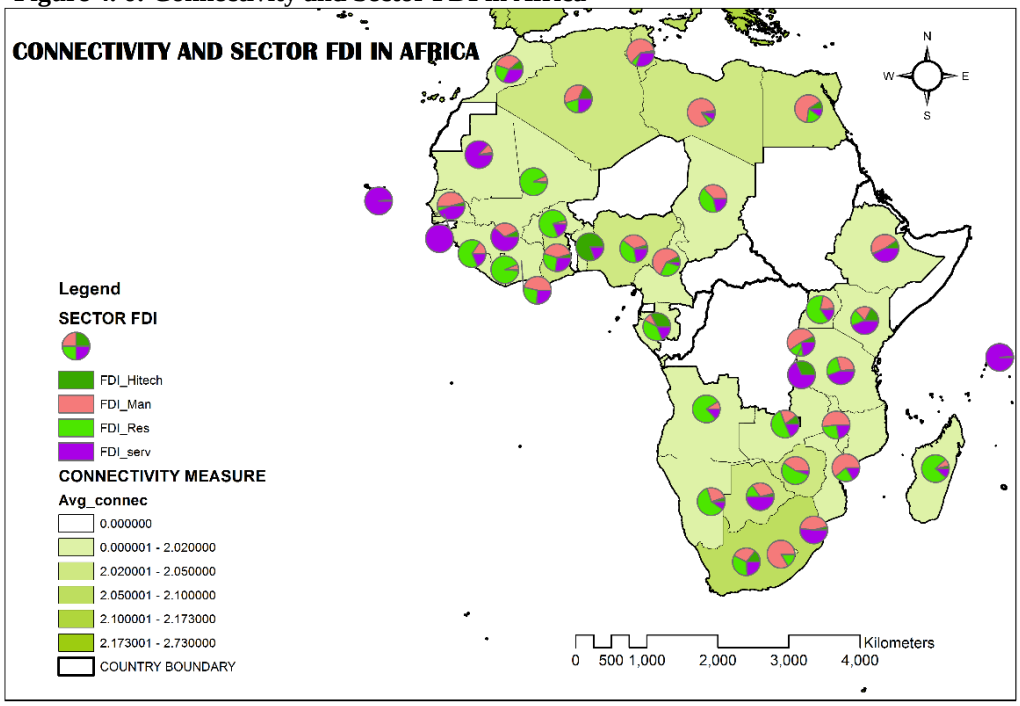
Infrastructure is significant to every economy and probably more significant to the developing economies and transportation network has a positive influence on the location and activity of MNE'S. The availability and quality of the road are important for manufacturing and resources sectors (Rietveld ,1989). This aids the effective and efficient movement of goods and product from one location to another. It is also important for transportation of raw material and agricultural produce in the primary sector (Musisi, 2007). Similarly, the network effect created by the road networks determine the location of most Headquarters of MNE'S, Service sectors and Retail activities (Hillier, 2009)

4.7.2.1 Connectivity and sector FDI

Connectivity reveals the capability of a particular spatial location (country) to be connected to other spatial location (countries) in the network. From figure 4.8 below, the map shows that locations with high values of connectivity in SSA are attractive to FDI in the manufacturing sector, with countries such as south Africa, Nigeria. On the hand, countries with lower connectivity measure are more attractive to resource and services as seen in most east African countries.

In Non-SSA locations with high connectivity values are attractive to to manufacturing sector with some activities from the resource and service and Hiech sector.

Figure 4. 6: Connectivity and Sector FDI in Africa

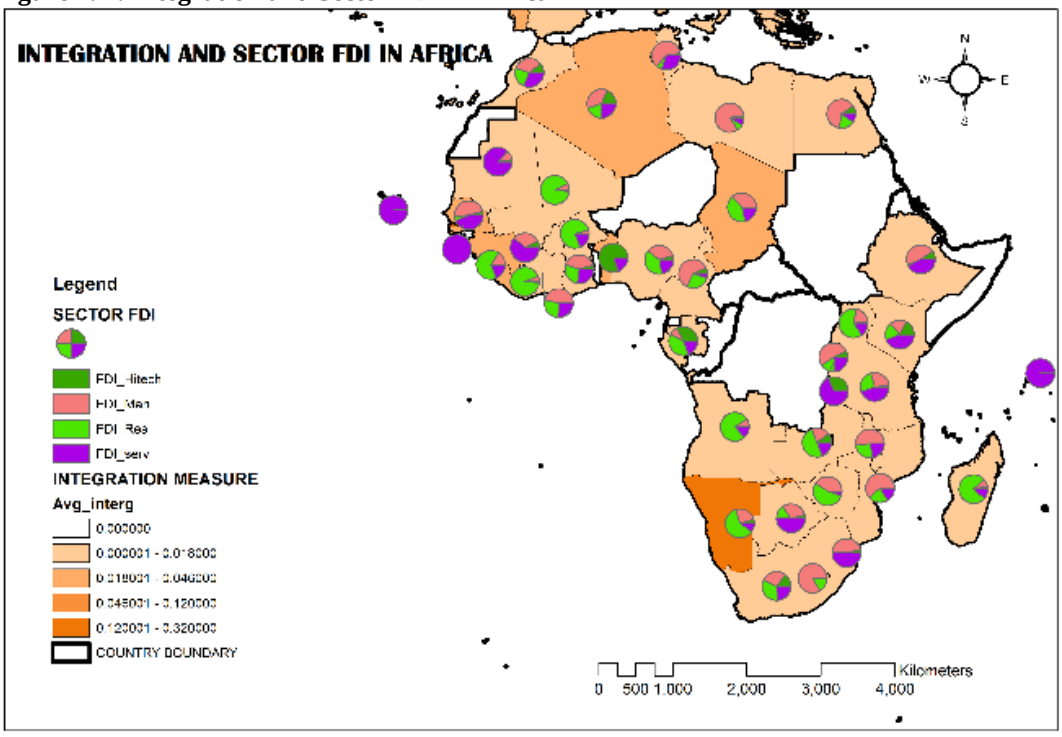


Source: Author2016.

4.7.2.2 Integration and sector FDI

Integration measures the closeness of a road segment to another segment within the network. From the map below the higher values are the most integrated and this location are attractive to services and manufacturing as well as service and Htech FDI, whereas the least integrated regions (the lighter portions) are more attractive to resources as shown in from figure 4.9 below

Figure 4. 7: Integration and Sector FDI in Africa

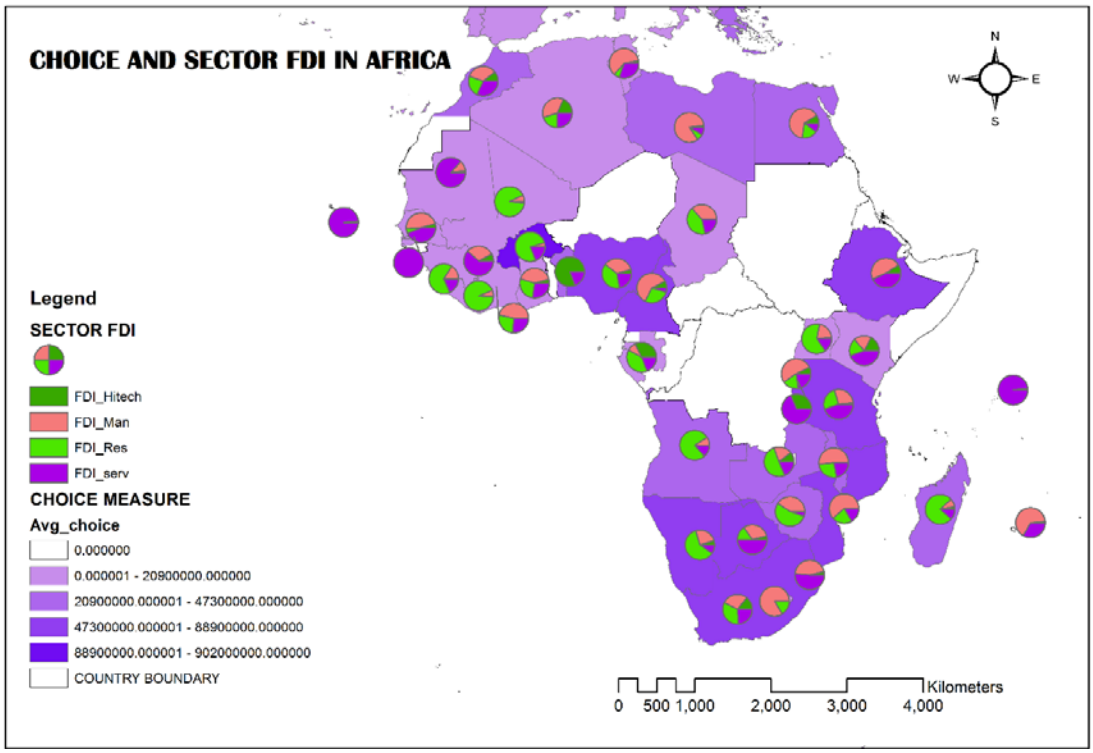


source: Author,2016

4.7.1.3 Choice and sector FDI

The choice measure as shown in figure 4.10 below determines the likelihood of a given location to be used more often as a route between origin and destination . locations with high choice measures like Burkina Faso, Ethiopia, Nigeria,Libya, Algeria and most southern African countries are attractive for manufacturing, services and resource FDI.

Figure 4. 8 Choice and Sector FDI in Africa

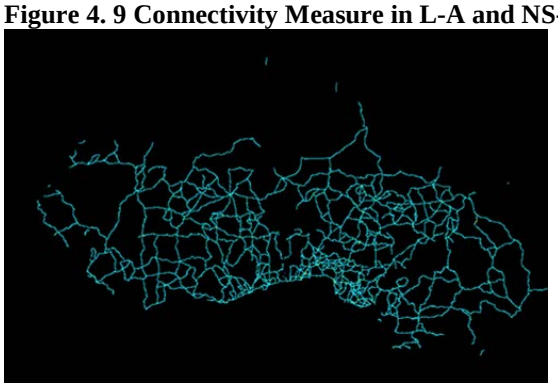


source: Author,2016

4.7.1.4 Display of infrastructure Network measures obtained from space syntax analysis

in addition, connectivity refers to the total number spatial unit directly connected or linked to each individual spatial unit in a network it is a measure of how connected a given location is other locations. Figure 4.11 shows the graduation of colours from red (most connected), yellow to blue (least connected) shows the extend of connectedness of a given location to all other location in the network.

Figure 4. 9 Connectivity Measure in L-A and NS-M Corridor

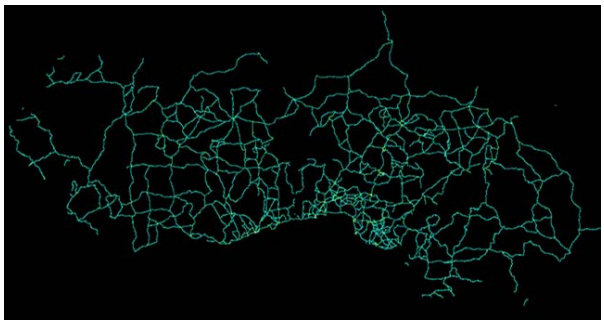


Connectivity measure of L-A corridor

Connectivity me.asure of NS-M corridor

The graduation of colours from red (most integrated), yellow to blue (least integrated) as shown in Figure 4.12 below indicates the propensity of a given location to serve as a possible destination(to-movement) for MNE's as they carry out FDI.

Figure 4. 10 Integration measure of L-A and NS-M corridor

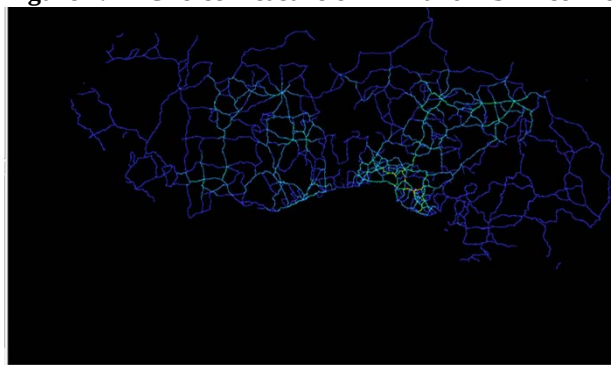


Integration measure of L-A corrido

Integration measure of NS-M corridor

The choice measure as shown in figure 4.13 determines the propensity of a given location being through to all destinations. It is the likelihood of a certain space (location) to be used more often as a route between origin and destination and is graduated from red (most desired route) to orange, yellow, light blue and dark blue (least desired route).

Figure 4. 11 Choice measure of L-A and NS-M corridor



Choice measure of L-A corridor

Choice measure of NS-M corridor

Q 2: To what extent does infrastructure network affect the flow of FDI into the Various sectors in Africa?

4.8 Inferential Analysis of Infrastructure Network and Greenfield FDI into Sectors in Africa

4.8.1 Network Measures and FDI to the Hitech Sector

The regression analysis of Hitech sector and connectivity measure shows that connectivity is not a significant determinant of FDI to the Hitech sector in Africa, however, GDP (0.71), a proxy used for the market size has a strong positive and statistically significant effect on the inflow of Hitech FDI into Africa (ANNEX 2 Table 2.10, model 8, R^2 = 0.69, 127 observations). Additionally, after controlling for Regional Economic Development, the Economic Community of Central African States (ECCAS) will attract more Hitech FDI than Economic Community of West African States (ECOWAS)[16]. The measure of integration or closeness is a negative statistically significant determinant of FDI with a coefficient of (-4.8) in ANNEX 2, table 2.8 model 6 (R^2 = 0.76, and127 observations), checking for robustness of the measure on FDI the local[17] and global[18] integration measures were considered (table

[16] Excluding Nigeria (an influential variable with high leverage and capable of distorting the outcome of analysis), ECCAS attracts more Hitech FDI than members of ECOWAS states

[17] Local integration indicates how close a given axial line(location) is only within a specified radius of topological distance (R3, R15, R30)

[18] Global integration indicates how close a given axial line(location) is to all other locations in the network

4.11below, R^2=0.57 with 127 observations) the local measures remain insignificant to FDI inflow, however, the global measure was very significant (- 5.74). It, therefore, implies that the further you move away from the area of influence the more your potential of attracting Hitech FDI declines.

The Choice measure is not a significant determinant of Hitech in Africa generally as shown in ANNEX 2 table 2.9. however, GDP a proxy for market size remained robust. To check for robustness of this measure, the local (ChoiceR30) and global integration(ChoiceN) measure are used to ascertain its impact on FDI as shown in table 4.12 below, none of the measures is a significant determinant of Hi-tech FDI inflow.

Table 4. 11: Global and local Integration Measure and sectors FDIs in Africa

Africa	(1) logFDI_Hitech	(2) logFDI_Man	(3) logFDI_Res	(4) logFDI_serv
integration	-5.74**	-6.61*	-1.35	-5.95***
	(1.77)	(2.89)	(2.09)	(1.50)
integration R3	28.65	20.50	-6.65	-1.60
	(20.95)	(18.43)	(24.18)	(0.95)
GCI_MEC	-0.19	-0.05	0.03	0.05
	(0.18)	(0.11)	(0.09)	(0.13)
logGDP	0.69***	0.55***	0.35*	0.69***
	(0.18)	(0.12)	(0.16)	(0.14)
Total Population	0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	0.02	0.23	-0.28	0.32
	(0.16)	(0.17)	(0.18)	(0.21)
Constant	-36.29*	-26.44	4.36	-11.97***
	(15.17)	(15.48)	(18.54)	(2.77)
Observations	127	196	109	226
Adjusted R2	0.57	0.43	0.43	0.64

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = institutional burden

This may imply that Hitech MNE'S may tend located in the most integrated cities and this is in line with findings of Omer and Goldblatt (2015)

Table 4. 12: Global and local Choice Measure and sectors FDIs in Africa

Africa	(1) logFDI_Hitech	(2) logFDI_Man	(3) logFDI_Res	(4) logFDI_serv
choiceN	-0.00	-0.00***	-0.00*	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
choiceR30	0.00	0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC	-0.21	-0.17	0.02	0.04
	(0.17)	(0.12)	(0.09)	(0.12)
logGDP	0.76***	0.60***	0.34	0.58***
	(0.18)	(0.15)	(0.19)	(0.14)
Total Population	0.00	0.00*	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	0.06	0.20	-0.28	0.32
	(0.16)	(0.20)	(0.18)	(0.20)
Constant	-14.56***	-10.05**	-0.78	-11.86***
	(3.17)	(3.28)	(3.68)	(3.02)
Observations	127	196	109	226
Adjusted R2	0.54	0.61	0.41	0.62

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = institutional burden

4.8.2 Network Measures and FDI to the Manufacturing Sector

The connectivity measure is not a statistical determinant of FDI in the manufacturing sector in Africa. However, GDP (0.49) is very strong positive statistically determinant of FDI to manufacturing sector ANNEX 2, Table 2.14 in model 8, with an R^2 value of 0.51 and 192 observations, the labour force is significant although with minimal effect. The measure of integration is a negative statistically determinant of FDI in Africa with an effect of (-8.02), GDP (0.47) and total population (0.00) are equally significant. In his model, ANNEX2, table 2.15, model 8, R2 = 0.48, with 196 observations.

The measure of choice is a negative statistically determinant of FDI in Africa with an effect of (-5.83) and GDP (0.68) is equally significant in table2.16, model 8, R^2 = 0.43, with 219 observations,

controlling for strategic location made it known that coastal countries attract more manufacturing FDI by 0.91 units than landlocked countries

This result implies that Manufacturing sector is least affected by the connectivity of the roads in Africa, however, it is dependent on market size which determines purchasing power of the people as well as the availability of labour. This implies that manufacturing in Africa is a combination of a market seeking FDI (dependent on the size of the market) and efficiency seeking FDI (dependent on lower factor input such as available and cheap labour). This market seeking characteristics is further explained by the significance of Integration to manufacturing FDI since their products go to the most integrated locations (streets, cities, and countries) with a high concentration of retail activities. (Dunning,2001; Olatunji and Shahid, 2015)

4.8.3 Network Measures and FDI to the Service Sector

The connectivity measure remained insignificant in the service sector as a determinant of FDI, while GDP continues to be robust in all models. After controlling for Regional Economic Community (Table 4.15, model 8 R2 = 0.66, with 226 observations), being in the East African community (EAC) will attract more FDI to the Service sector than the ECOWAS.

This implies that compared with ECOWAS (excluding Nigeria), EAC attracts more FDI in the service sector and this is shown in chart 4.16 and 4.19 above where FDI in service sector spreads across the countries in EAC whereas in ECOWAS it is concentrated in Nigeria.

The measure of integration is a negative statistical significant determinant of FDI in Africa with an effect of -4.75. However, after controlling for additional variables the measure of integration becomes insignificant while GDP (0.56) and total population (0.00) maintained their significance equally significant. In his model, table 4.16, model 8, $R^2 = 0.66$, with 226 observations.

The choice measure is a very strong negative statistical significant determinant of FDI into service in Africa with minimal effect (0.00). choice remained robust along with GDP (0.62) all through the models. table 4.16, model 5, R2 = 0.60, with 226 observations. This result implies that in line with global theories of the network, integration and choice measures are significant determinants of FDI into service sectors (hillier,2009; Omer and Goldblatt, 2015; Vaughan et al., 2010). This finding suggests that in line with African diversification agenda, increasing the integration and choice measures through the deliberate planning of road transport infrastructure in African cities should be included in development policies.

Although connectivity is not significant for FDI to service sector, this could be as a result of the heterogeneity of the data set in terms of size, road networks and FDI inflows. Therefore, further analysis of regions and sub-regions may yield contrary effect, since in developed and emerging market the service sectors are the major drivers of the economy

4.8.4 Network Measures and FDI to the Resources Sector

the connectivity measure is insignificant as a determinant of FDI to the resource sector in Africa (ANNEX2 table 4.17) This sector, which is the predominant sector that attracts FDI into both sub-Saharan and non-sub-Saharan Africa requires a link from the source of raw materials to the ports for exports or factories for value addition. It is least affected by the lack of proper connectivity as long as there is a stretch a road to the ports. However, investigation into the quality of the road infrastructure and FDI inflow to resource sector may be a subject of further research

Integration measures is also not a significant determinant of FDI to the Resource sector (table 1.18) since the most sources of resources is not located in the most integrated segment of the countries or cities. Improvement in the quality of road infrastructure and linkage from the source of raw materials is of great essence in the resource sector.

The measure of choice is a significant determinant of FDI into Resource sector with minimal effect (0.00) after considering for institutional burden as shown in table 2.19 (model 5, R2 = 0.36 with 109 observations). This implies that FDI inflow increases as the propensity of a location for through movement increases in the advent of insecurity, violence and institutional weaknesses. It suggests that resource FDI is attracted to a location with high capacity for through movement (betweenness) most

probably as an adaptive and preventive measures against instability (both political and social) that a location becomes a significant for through movement of resource FDI

4.8.5 Sector FDI to different Regions in Africa.

The peculiarity of Africa geography, macroeconomic policies, demography, resource availability and economic communities has an influence on the inflow of FDI to the region. This prompted further analysis by disaggregating the two major regions of sub- Saharan Africa and non-sub-Saharan Africa so as to further understand the dynamics of sector FDI in Africa.

4.8.5.1 Connectivity and sector FDI in SSA and non-SSA

Connectivity measure is a very strong significant negative determinant of FDI to the Hitech sector (-52.7), resource sector (-17.43) and the service sector (-26.51) in the non-SSA region as shown in table 4.13 below. This implies that an increase in connectivity has the tendency of reducing the flow of FDI to these sectors, and this is contrary to the findings of Omer and Goldblatt (2015) who posits that locations with high connectivity define the spread of retail and service sector activities. conversely, total population, a proxy for availability of labour has a significant impact on FDI to Hi-tech, manufacturing and service sectors in Non-SSA. this emphasises the relevance of labour for the inflow of FDI in this region and the FDI attracted may be more efficiency seeking than market seeking. In like manner, institutional burden a proxy for insecurity and weak institutions is also a significant determinant for service and manufacturing FDI in non-SSA. However, connectivity remained insignificant to all sectors in SSA. However, its impact is significant in some regions at the sub-regional level. In west Africa, connectivity is a significant determinant of FDI inflow to Hi-tech (70) and service (60) sectors respectively whereas, in East Africa, it is a significant determinant of FDI to manufacturing (36), Hi-tech (-62) and resource (159) sectors respectively. while market size as argued by Naude´and Krugell (2007) is also significant to FDI. (Burger et al., 2013).

This finding indicates that increasing connectivity in Non-SSA may be counterproductive and result in FDI decline in the three sectors. This may be as a result of the nature of FDI it attracts since, in the service sector, it attracts mostly software, ICT and communication, Financial and business services, real estate; in the Hitech it attracts mostly, Automotive OEM, pharmaceuticals and biotechnology and the resources sector characterized by investment into coal, oil and natural gas (FDI Intelligence,2015); and the state of its infrastructure network. furthermore, this finding may be due to an indirect effect of the institutional burden which hinders infrastructure investment in this region coupled with their peculiar desert terrain hence reducing the flow of FDI into the sectors. however, the reason for this behaviour is a subject of future research.

Table 4. 13: Connectivity and sector FDIs to SSA and Non- SSA Region in Africa

AFRICA	**(SSA) logFDI Hitech**	**(NSSA) logFDI Hitech**	**(SSA) logFDI Man**	**(NSSA) logFDI Man**	**(SSA) logFDI Res**	**(NSSA) logFDI Res**	**(SSA) logFDI serv**	**(NSSA) logFDI serv**
connectivity	4.69	-52.46***	-0.66	-20.16	-6.62	-17.43**	3.74	-26.51**
	(8.89)	(12.14)	(4.06)	(21.33)	(12.90)	(6.71)	(5.47)	(9.36)
GCI_MEC	-0.60**	0.43	-0.27	-0.00	0.03	-0.03	0.01	-0.13
	(0.22)	(0.29)	(0.17)	(0.33)	(0.15)	(0.06)	(0.17)	(0.20)
logGDP	0.78***	-0.78	0.52***	-0.53	0.30	0.29	0.56***	-0.17
	(0.18)	(0.48)	(0.12)	(0.53)	(0.17)	(0.31)	(0.16)	(0.46)
totalPopulation	0.00	0.00***	0.00*	0.00*	0.00	0.00	0.00	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	-0.08	0.46	-0.13	0.86**	-0.41	-0.26	-0.09	1.21***
	(0.22)	(0.44)	(0.19)	(0.29)	(0.26)	(0.23)	(0.22)	(0.19)
Constant	-21.18	124.16***	-4.64	55.02	13.66	35.90*	-16.18	58.68***
	(14.41)	(24.39)	(9.35)	(50.88)	(24.37)	(17.06)	(10.23)	(16.98)
Observations	89	38	156	40	85	24	185	41
Adjusted R2	0.48	0.93	0.48	0.88	0.43	0.95	0.58	0.97

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = institutional burden

4.8.5.2 Integration and sector FDI in SSA and non-SSA

Integration is a negative statistical determinant of FDI inflow to manufacturing (-4.61) and service sectors (-4.96), however, its significance is limited to sub-Saharan Africa and GDP a proxy for Market size is a very strong positive determinant of both manufacturing and service FDI in SSA. Conversely,

the institution burden is a very strong positive determinant of FDI to service sector (1.15) in the non-SSA region as shown in table 4.14 below.

This implies that the MNE's located in SSA for manufacturing activity may be more market seeking oriented since infrastructure network and market size (Chakrabarti,2001) not labour force is a strong factor for FDI in the sector as indicated by Dunning (2001). Similarly, service sector is highly dependent on market size

Table 4. 14: Integration and sector FDIs to SSA and Non- SSA Region in Africa

	(SSA) logFDI Hitech	(N-SSA) logFDI Hitech	(SSA) logFDI Man	(N-SSA) logFDI Man	(SSA) logFDI Res	(N-SSA) logFDI Res	(SSA) logFDI serv	(N-SSA) logFDI serv
integration	-2.20	-23.87	-4.61*	2.12	-1.46	59.57	-4.96**	-18.32
	(1.31)	(148.21)	(2.02)	(113.79)	(3.39)	(49.56)	(1.70)	(82.21)
GCI_MEC	-0.56**	0.44	-0.22	-0.01	0.05	-0.07	0.04	-0.13
	(0.20)	(0.32)	(0.17)	(0.28)	(0.18)	(0.10)	(0.18)	(0.14)
logGDP	0.82***	-0.72	0.54***	-0.52	0.27	0.32	0.61***	-0.13
	(0.11)	(0.49)	(0.11)	(0.62)	(0.16)	(0.34)	(0.15)	(0.51)
Total Population	-0.00	0.00*	0.00*	0.00	0.00	0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	-0.10	0.28	-0.12	0.82	-0.35	-0.22	-0.06	1.15***
	(0.21)	(0.65)	(0.19)	(0.45)	(0.26)	(0.25)	(0.23)	(0.26)
Constant	-12.53***	17.29*	-6.53*	13.94	0.68	-1.01	-9.84**	4.20
	(3.26)	(8.50)	(3.24)	(10.63)	(4.36)	(7.82)	(3.74)	(9.33)
Observations	89	38	156	40	85	24	185	41
Adjusted R2	0.49	0.72	0.42	0.86	0.35	0.95	0.58	0.78

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = institutional burden

4.8.5.3 Choice and sector FDI in SSA and non-SSA

The choice measure is a significant negative determinant of FDI to manufacturing (-0.00), and service (-0.00) in SSA with a robust GDP as shown in table 4.15 below. however, choice in Non -SSA remained insignificant to all sectors. This finding suggests that the FDI attraction of location declines minimally as its propensity for through movement (betweenness) reduces since an increase in the number of steps (a distance of a location from another location) reduces the attractiveness of the location.

Table 4. 15: Integration and sector FDIs to SSA and Non- SSA Region in Africa

	(SSA) logFDI Hitech	(N-SSA) logFDI Hitech	(SSA) logFDI Man	(N-SSA) logFDI Man	(SSA) logFDI Res	(N-SSA) logFDI Res	(SSA) logFDI serv	(N-SSA) LogFDI serv
choiceN	-0.00	0.00	-0.00***	-0.00	-0.00	-0.00	-0.00***	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
logGDP	0.83***	-0.65	0.52***	-0.53	0.25	0.33	0.57***	-0.10
	(0.14)	(0.50)	(0.13)	(0.63)	(0.15)	(0.33)	(0.16)	(0.53)
GCI_MEC	-0.59*	0.45	-0.29	-0.01	0.03	-0.06	0.02	-0.13
	(0.25)	(0.32)	(0.17)	(0.29)	(0.15)	(0.10)	(0.17)	(0.15)
totalPop	0.00	0.00	0.00**	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	-0.08	0.20	-0.17	0.83	-0.35	-0.28	-0.10	1.13***
	(0.22)	(0.62)	(0.20)	(0.44)	(0.27)	(0.25)	(0.22)	(0.26)
Constant	-12.87**	15.14	-5.50	14.16	1.21	0.19	-8.80*	2.98
	(4.05)	(10.30)	(3.83)	(12.99)	(4.24)	(8.02)	(3.87)	(11.83)
Observations	89	38	156	40	85	24	185	41
Adjusted R2	0.48	0.71	0.63	0.86	0.33	0.92	0.58	0.87

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

GCI_MEC = Macro Economic Environment Catalyst, GCI_InstB = institutional burden

4.9 Summary of Findings

This study shows that the infrastructure network as measured by integration and choice and connectivity is a significant determinant of FDI inflow to Hi-tech, manufacturing, and service sectors in Africa with the exception of resource sector and their impact varies according to the sector. The integration measure of infrastructure network remained robust with significant elasticities in the three sectors. It indicates

that as segregation (i.e. reduction in integration due to an increase in step or distance of one location to other locations) increases in Africa as a result of the low infrastructure network, FDI to manufacturing declines by 8.02%, to service sector by 4.75%, to Hi-tech by 4.8%. Similarly, Increase in the choice also known as betweenness (the measure of the number of times encountered within the shortest distance to all locations) reduces the flow of FDI to manufacturing sector by 5.8% and to service and resource sector minimally. These measures show the impact infrastructure network (integration and choice) on manufacturing sector is more than in other sectors. This could be due to the high significance of transport infrastructure for manufacturing activities, involving both raw materials inflow and outflow of finished products as well as the need for efficient delivery of product in time and in good condition. This finding supports the work of Larson (1999) who found transportation industry to be integral to success of manufacturing enterprises' and Kumar, (2001) posited that the geographical distance between the home and the host country has a negative effect on FDI and distance reduces the capacities of countries to attract investment (Ndulu,2006).

In addition, the finding also shows that connectivity measure of infrastructure has no significant impact on FDI to all sectors. This may be as a result of Heterogeneity of the countries in Africa in terms of FDI inflow to the sectors as well as infrastructure network distribution across the countries. However, further analysis by sub-regions may reveal contrary finding. This led to further investigation and in SSA, connectivity is found to be Significant for FDI to Hitech sector with significant elasticity (60) and to service sector (70) in west Africa and similarly, it is significant to FDI inflow in the manufacturing sector (53) and resource sector (159) respectively. This shows that at the sub-regional level the impact of infrastructure network is more than at continental level based on the peculiar needs of the different sub-regions and accessibility of a location is imperative for MNE'S. This finding is in line with the work of Porta et al (2012) for Barcelona, who found that roads with good connectivity have high accessibility. Similarly, Omer and Goldblatt (2015), posits that locations with high connectivity define the spread of retail and service sector activities.

Conversely, connectivity has a significant negative impact on FDI to Hitech sector (-36) in East Africa and this sector is comprised of Automotive OEM, Business services, aerospace, and pharmaceuticals. This finding may be related to the low quality of road infrastructure in east Africa which may increase transport cost since this sector is sensitive to the delivery of products in time and in good quality. According to Rehman et al., (2011), Poor infrastructure result to increase in transaction cost and limits entry to both local and international markets and this discourages FDI in developing countries and based on the road quality index developed by Piet, et al. (2010), countries in the EAC ranked low. Similarly, according to GCI Report, East Africa ranked low in quality of road infrastructure (WEF, 2015), despite its slight improvement from previous years and the investment efforts by the EAC and Development Agencies. Despite the road condition, EAC ranks higher than other regions in the quality of road transport service measured by logistics performance index and this result to High traffic along its corridors due to efficient trucking services (Teravaninthorn and Raballand 2009). This implies that a further increase in the connectivity of road infrastructure with low quality can reduce the flow if FDI to that region. Hence, improving the quality of the road infrastructure network is essential for East Africa as showed by Teravaninthorn and Raballand (2009), that improvement in the quality of road infrastructure in east Africa will tend to reduce transportation cost by 15%. Additionally, in SSA, an increase in topological distances of integration will result in a decline of FDI to manufacturing sector by 4.6% to and to service sector by 5% respectively. While increasing the measure of choice reduces the attractiveness of a location for FDI. Hence, minimally reducing the inflow of FDI to manufacturing and service sector in SSA.

These sectors comprise of manufacturing retail in communication, consumer electronic and consumer products, textile, food and tobacco, beverages, textile, financial and business services, hotel and tourism with the exception of few countries like south Africa that are into advanced manufacturing of industrial machine, equipment and tools, metals and automotive components (FDI intelligence,2015). These products are mostly market seeking and hence require retail outlets which are sensitive to road infrastructure it can, therefore, be said that increasing accessibility (integration) and intermediary (choice) of locations in SSA will increase the inflow of FDI with probably the same unit. According to Deichmann (1997), more accessible locations enhance the efficiency of enterprise and the potential for

contacts or interaction within the location of economic activities. This implies that as the proximity of an enterprise from another and to market increases the tendency of reaping the benefit of economies of scales also increases. this finding is in line with the work of Omer and Goldblatt (2015), who found a strong relationship between the network centrality measures and service / retail activity in Israeli towns. Similarly, Vaughan et al, (2010) in London, found that service activities and retail tend to concentrate in a location where the centrality measures especially choice(betweenness) are higher. However, the infrastructure network measure of choice and integration does not affect the FDI inflow to Hitech sector in SSA and resource sector in both Africa and SSA. this may be due to the minimal requirement for mobility in this sector. Probably a good quality of road segment from the source of raw material or resource to its destination (factory or port) may be the major requirement for investors. On the other hand, in Non -sub-Saharan region, none of the infrastructure network measures is significant to FDI in the manufacturing sector. This sector which comprises of real estate, building and construction materials, metals, and industrial machinery, equipment and tools. These type of product may majorly require a direct link to their destination rather than a network of infrastructure and it is in line with the findings of Porta et al (2012). While Connectivity measure is a strong negative significant determinant of FDI to the Hitech, resource, and the service sector in the non-SSA region. This implies that as connectivity increases FDI to these sectors declines. Based on theories and empirical findings infrastructure network is required for the efficient functioning of MNE's. However, this finding is contrary to the works of Omer and Goldblatt (2015) and Dicken (2007)

4.10 Other Findings:

Institution burden

The result of analysis shows that institutional burden has a negative influence in FDI into Europe, however with further analysis it was found the institutional burden reduces the flow of FDI into Eastern Europe only and is insignificant in Western Europe this is supported by the work of work of Asiedu, (2006) who found that insecurity, political risk, terrorism, crime and violence in host country reduces FDI inflow. Similarly, Alsan et al (2004) indicated that bureaucratic bottlenecks, corruption, crime and violence impede the flow of investment into countries. However, in Africa, the result is contrary with a reverse sign from what was earlier hypothesised. The results suggest that higher levels of government burden, corruption, business cost of violence and business cost of terrorism are concomitant with a higher inflow of FDI to Africa. This is further analysed at the regional level and the impact is significantly high in non-sub-Saharan African countries with insignificant impact in SSA.

It is evident that most of the African countries that ranked low in corruption perception and ease of doing business and also considered fragile by the world bank are resource rich with significant investment to resource, manufacturing and service sectors. This implies that availability of natural resources may be related to the inflow of investors into these countries despite their level of perceived corruption, lack of relative peace and constraints in the ease of doing business. The later work of Alson et al (2006) argues that higher levels of corruption are associated with higher levels of FDI in low- and middle-income and this finding is in line with Graham, B. (2012) who concluded that "Some firms have high capacity to function efficiently and profitably in the face of violence, low institutional function and terrorism. It is consistent with the findings of Guidolin and Ferrara (2007). Additionally, Fu,et al (2015) also found similar evidence with a great inflow of FDI to fragile states from emerging countries and countries with less supportive and weak institutions. The International Monetary Fund (2015) also showed supportive evidence of massive investment in resource sector (extractive) and infrastructure in fragile and low-income Countries in Africa.

Since this FDI inflow and institution is associated with Non- SSA, further investigation into the region revealed that based on 2014 Ease of Doing Business ranking the countries in North Africa ranked low with Libya (188) and Algeria (154), Egypt (112), Morocco (71) Tunisia (60). Similarly, the Corruption Perception Index of Transparency International (2014), measures the perceived level of corruption in 175 countries. The CPI reflects political stability and effective public institutions with higher rank depicting poor score with an indication of widespread bribery, inadequate or complete lack of penalties for corruption and weak/insensitive public institutions). Considering the top destinations of FDI in Africa, Libya (166) ranked the lowest followed by Angola (161), Uganda (142), Nigeria (136),

Mozambique (119) Algeria (100), Egypt (94), Morocco (80), Tunisia (79), and countries with prevailing corruption incidences are considered the least peaceful (Transparency International, 2014). By further analysing the impact of infrastructure on FDI inflow to sectors, the institutional burden was clearly associated with manufacturing and service sectors. This is, however, contrary to previous findings however based on FDI Intelligence (2015), the bulk of the investment to service sector is from the middle east (with high insecurity and instability resulting from terrorism and the r Arab spring) and emerging Economies like India and china (with weak institutions). This further support the work Fu,et al (2015). Despite the progress made by these countries in attracting FDI, the non-sub-Saharan region of African has experienced a decline like the rest of the world and particularly with the advent of the Arab Spring and FDI Intelligence (2013) stated that investment declined in some countries in middle east and Africa due to the widespread of civil unrest and political instability. This implies that despite risk adaptation of MNE's and natural resources abundance, institutional burden characterised by the business cost of terrorism and violence as well as weak institutions have a detrimental impact on the flow of FDI into non-sub-Saharan Africa. A typical example could be case of United Arab Emirate and Saudi Arabia which are equally resource-rich countries with macroeconomic stability, good institutions, non-fragile states as well as good infrastructure have a diversified economy and attract investment to different sectors of their economy Therefore it can be said that the inflow of FDI from countries with weak institutions and fragile economies is not deterred by institutional burden in Africa. However, it is not the volume of investment that matters but its ability to translate into a meaningful development

Chapter 5: Conclusion and Recommendation

5.1 Introduction

Infrastructure network is regarded as an indispensable tool for productivity improvement, economic efficiency as well as Global and Regional Integration, and the efficiency of good infrastructure endowment enhances the attractiveness of a country as a location for Multinational Enterprises. The expansion of these MNE networks through Foreign Direct Investment (FDI) serves as an important instrument for integrating countries into the Global Economic Network (Global Economic Integration) by enhancing the potential for exchange of resources, goods, services, innovations and ideas. This will further increase competitiveness, growth and development of the host country (Tintin, 2012; Navaretti et al.,2004). This study assesses the impact of infrastructure network on the inflow of greenfield FDI in Lagos-Abidjan corridor and Africa by benchmarking the North Sea Mediterranean corridor and Europe. This is done by analysing the road transport infrastructure networks of 78 countries from both Africa and Europe obtained from GIS and space syntax analysis in DepthMapX software and greenfield FDI inflow obtained from the FDI market, using Random Effect model of panel data regression.

5.2 Retrospect: research objective

How does the hard physical Infrastructure network determine the inflow of Foreign Direct Investments inflow in Lagos – Abidjan Corridor in Africa and the North Sea – Mediterranean corridor in Europe?

Sub-questions:

I. Does infrastructure network determine the inflow of FDI into:
   a) Africa and Europe;
   b) Lagos-Abidjan Economic corridor and the North Sea – Mediterranean corridor?

II. To what extent does infrastructure network affect the flow of FDI into the Hitech, manufacturing, resource and service sectors in Africa.

5.3 Interpretation of the Main Research Question

Assessing the influence of infrastructure network on FDI in L-A and NSM corridor and in Africa and Europe respectively, the ability of infrastructure measure of connectivity, integration and choice were analysed in both Africa and Europe as well as in L-A and N-SM corridor and further analysis regarding the extent of the impact of infrastructure network to the Hi-tech, Manufacturing , resources and service sector was carried out and the findings from this analysis shows that infrastructure network is a

determinant of FDI inflow to both Europe and Africa as well as to L-A and the NS-M corridor, it further shows the extent of the impact of infrastructure network on FDI inflow to Hitech, manufacturing, resources and service sectors respectively. With this evidence, it can be stated that hard physical infrastructure network determines the inflow of FDI in the L-A and the NSM as well as in Europe and Africa. Despite the significance of infrastructure network to both regions, their impact differs as seen from this study. This supports the works of other researchers who found infrastructure network as a significant determinant for attracting FDI in developed as well as developing countries (Khadaroo and Seetanah, 2010) including countries in Africa, with varying impact in accordance to sub-regions (Asiedu, 2006). However, according to Addison et al. (2006) infrastructure promotes FDI only for developed countries. Whereas, Crescenzi et al. (2016) argue that the availability of a good infrastructure endowment may be a factor resulting from the process of regional development, rather than one of the engines that drive it. However, despite these arguments the finding has shown that infrastructure network influences the inflow of FDI in both developing and developed countries in Europe and in Africa, with some variations in the magnitude of their impact. This depends on the sub-region as well as the strength of the Regional Economic Community.

The study shows that the infrastructure network will tend to increase FDI in Europe by 1.3% – 5.4%, in EU member states by 1.3% and in Western Europe by 3.7%. However, in Eastern Europe the impact is higher (33%) but has no effect on non-EU member states in Eastern Europe, however, institutional burden (negative determinant), market size and labour force are significant for FDI. Similarly, in Africa, the infrastructure network will tend to increase the inflow of FDI by 4.5% and in West Africa by 74% and Eastern Africa by 43% with no significance to Northern and Southern Africa. this lack of significance in Northern and Southern Africa is a subject of further studies

Infrastructure network has an impact on service, resource and manufacturing sectors in SSA with higher impact on Manufacturing sector. In addition, REC's in Southern and Eastern Africa attracts more FDI than ECOWAS by 1.13%(SADC) and 0.99% (EAC) indicating that some REC's outperform others in FDI attraction and this may be due to good policies and initiatives, similarly, coastal areas attract 0.85% more FDI than Landlocked regions in Africa, and this is contrary to what is obtained in Europe (strategic location is insignificant).

The insignificance of strategic location in Europe indicates the ability of Europe to bridge the gap between coastal and landlocked areas by adequate provision of a general infrastructure network (in terms road, rail and inland waterways) achieved mainly by REC initiatives of the EU, hence, showing the importance of REC regarding infrastructure and FDI attraction. The finding shows that infrastructure network, Regional Economic Community, and large market size are essential for FDI attraction in EU member states, whereas FDI to non-EU member states is sensitive to macroeconomic stability, large market size and good institutions. Conversely, in Africa, infrastructure network and large market size is a determinant of FDI to SSA whereas in non-SSA, Institutional burden and labour force are the major determinant of FDI inflow. This further indicates that infrastructure network improves the investment climate in Africa and Europe as well as the two corridors respectively. Thus, enhancing the road transport infrastructure offers opportunities for MNE's to compete favourably in the international market, enhance employment opportunities for the citizens as well as generate long-term benefits via enhanced connectivity. This is in accordance with the works of Rietveld (1989), who found out decades ago that interregional trade flows and manufacturing economies are attracted by good connectivity of transportation infrastructure networks for movement of goods and people with ideas/innovations, and Storper, (1997) posited that "network of firms tied together into production systems are not only dependent on the territorial context of physical and intangible inputs, but they have greater or lesser relationship with proximity to each other. This shows the relevance of integration and choice measures of infrastructure network in attracting FDI to a given location since the concentration of economic activity and several other attractive lands uses in a city or country is characterized by high level of network centrality measures and these locations attracts more people (market) and investors Omer and Goldblatt (2015); Vaughan et al, 2010).

Furthermore, Choi, et al. (2006), argues that infrastructure linking geographic areas is one of the key drivers and enablers of global economic development and integration. Furthermore, Dicken, (2007) states that "Transportation infrastructure serves as the circulation routes connecting together the various components of the production network of Multinational Enterprise and Lund (2016) further emphasised

that the totality of infrastructure should function as a means of facilitating mobility in any society. Therefore, this suggest that Connectivity, integration and choice as a result of road transport infrastructure network not only improves the flow of vehicles, goods, services and people with great ideas and knowledge within and between dynamic and competitive locations, it also connect communities, cities, countries and regions thus stimulating economic growth, job creation and investment. This can be achieved in Africa as was and is still done in Europe by building and strengthening the Regional Integration Initiative of the African Union (AU) as well as the REC's, by making the provision of infrastructure a topmost priority in the region's development agenda as obtained in EU (Crescenzi, et al., 2015).

5.4 Conclusion

The relationship between the spatial configuration of infrastructure network and the spatial pattern of FDI location is based on the analysis of the value of FDI in a given location (country) and the values of three space syntax attribute (infrastructure network measures) of connectivity, integration and choice. and these attributes represent accessibility (degree centrality), the potential for to-movement (closeness centrality) and the potential for through movement (betweenness centrality) as used by Omer and Goldblatt (2015). In contrast to the previous studies conducted in the area of infrastructure and FDI, the originality of this research resides in some specific aspects. Firstly, the treatment of infrastructure as a spatial network with topological dimension, using GIS and space syntax analysis. Secondly, the methodology adopted for the empirical investigation, whereby spatial and econometric approaches are both used. Thirdly, using a spatial configuration of infrastructure network measures and a non-spatial unit flow of investment (greenfield FDI) representing the spatial location of MNE's to explain the extent of global economic integration. And lastly, confronting Infrastructure network with other factors, such as macroeconomic environment, institutions, market size, labour force and controlling for strategic location, ethnolinguistic diversity and regional economic community which also may play a significant role both in FDI attraction in regional economic integration.

The impact of infrastructure network on the inflow of greenfield FDI into in Lagos-Abidjan Corridor in Africa is the motivation of this research. This is achieved by benchmarking the North Sea Mediterranean corridor in Europe. In the following paragraph, the findings discussed from the previous section in relation to existing theories and previous studies will be concluded. This will be in three sections. The first section consists of conclusions on the analysis of infrastructure networks and FDI inflow to Africa and Europe. The second section will consist of conclusion on infrastructure network and FDI inflow to Lagos-Abidjan Corridor, the third section will be on conclusion on infrastructure network and FDI inflow to the Hitech, Manufacturing, Resources, and Service sector in Africa

Firstly, this study analysed the impact of infrastructure network on FDI inflow into Africa and Europe. And findings showed that infrastructure network is significant for FDI inflow to both Europe and Africa. However, variation exists in its impact. In Europe infrastructure measure of connectivity and integration is significant for FDI inflow and this measures are associated with service and retail activities with little to do with primary sector. And based on OECD report 2015 and FDI Intelligence (2014), Europe attracts more FDI to the service sector. Whereas the choice measure remained strongly insignificant even at the sub-regional level. This could be attributed to the developed infrastructure links coupled with good transport and logistics services within Europe that facilitates ease of movement to a destination. Therefore having a minimum requirement for intermediacy location (choice) and this may also be the reason for the insignificance of a strategic location dummy variable since the gap between coastal and landlocked areas has been bridged by good road transport infrastructure and logistics service. Furthermore, In Western Europe Integration measure of the infrastructure network, along with market size are significant determinants of FDI and the significance of market size can be associated with market seeking FDI, while in Eastern Europe the integration measure has a Larger impact on FDI. Similarly, the significance of other location and competitiveness factors such as market size, macroeconomic stability, labour force and institutions, Indicates the tendency that significant proportion of FDI in Eastern Europe may be efficiency seeking aimed at lower transaction and input cost (Dunning, 2001; Pandya,2010). The insignificance of choice measure of infrastructure networks in both Eastern and Western Europe may be a subject for further research. Further analysis based on REC shows that the integration measure is only significant to EU states. This implies that infrastructure

network only increases the flow of FDI into EU member states in both regions. This may be attributed to the massive multimodal transport infrastructure project embarked upon by the EU (European Council,2014. These findings show that infrastructure network coupled with good Economic integration, stable macroeconomic environment, large market size and minimal institutional burden is necessary for the member states of the EU from Eastern Europe.

In Africa, the integration measure of infrastructure network is the most significant, with West and East Africa only showing sensitivity to connectivity measure. In addition, the choice measure is significant with minimal impact in SSA only, whereas connectivity measure of infrastructure network has a negative effect on FDI inflow to non-SSA While other measures remain insignificant. Additionally, institution burden is very significant for investment coupled with labour force whereas market size remained insignificant to FDI inflow in non-SSA. These result in non-SSA is a subject for further research. Finally, it can be said that in Africa, market size, labour force and institution in addition to infrastructure network are a significant determinant of FDI. Contrary to Europe, coastal regions in Africa and SSA attracts more FDI than landlocked areas and regions with good Regional Economic community(REC) attract more FDI than regions with weak REC. The significance of integration or closeness measures of infrastructure network implies that for countries in Europe, being close to each other and the intended market, as well as having high accessibility is paramount for FDI attraction, and locations within close proximity facilitate interaction and exchange between firms and with their existing and potential market, especially in retail and services. it can, therefore, be stated that infrastructure network measured by connectivity, choice and integration is a determinant of FDI in Europe, however, it only increases the inflow of FDI to EU members in both western and Eastern Europe and in Africa it is a significant determinant to SSA with contrary effect on non-SSA. Therefore, for Africa to diversify its economy and shift from traditional FDI in resources, and improve the volume and nature of FDI it attracts this study shows that along with enhancing infrastructure network it needs to improve its macroeconomic environment reduce its institutional burden and enhance the quality of its regional economic community.

Secondly, Infrastructure network in the NS-M corridor and the L-A corridor is essential for investment decision of MNE's. This study shows that infrastructure network is a strong determinant of FDI inflow into NSM corridor with significant impact from all the three measures of infrastructure measures (connectivity, integration and choice) and the robustness was checked at the various radius and it remained significant. This shows the significance of the NS-M as a preferred location for investment (degree centrality or connectivity); a location with brokerage capacity (closeness or integration); and a location with a high propensity for through movement of FDI (betweenness or choice). This together with market size that increases the propensity for profitability and teeming labour force are a necessity for an increased inflow of FDI to countries along the corridor as it stands as the gateway not only to eastern Europe but the entire European continent. similarly, in L-A corridor, the infrastructure measure of connectivity was robust with higher impact on FDI than NS-M corridor. This could be attributed to the saturation of infrastructure network in NS-M and the further increase may yield no significant impact, however for the L-A corridor improving its infrastructure network has a huge significance for FDI attraction and increase its importance as a preferred location for MNE's. Furthermore, the measures of integration and choice as other proxies for infrastructure network were significant however not very robust. In addition, French-speaking countries also attract less FDI than English speaking countries. This finding shows the significance of the corridors as a location for investment since FDI is attracted to locations that are connected with other locations as stated by Rietveld (1989) who found out that interregional trade flows and manufacturing economies are attracted by the good connectivity of transportation infrastructure networks. However, from the analysis, as a coastal corridor, L-A's ability to feature effectively as an intermediate (between location or choice) and accessible (integrated or close) location for FDI to Africa is minimal. This may be due to the inadequate linkages of good quality transportation infrastructure between the coastal region and hinterland within the corridor; fragmented sovereign nations(countries) with ethnolinguistic diversity; multiple economic communities and border sharing with nations of diverse and counterproductive Macro-Economic policies; institutions; and the heterogeneity of potential market size of countries along the corridor. These inadequacies have the capacity to impede on development and FDI attraction. Therefore, effort aimed at regional integration through infrastructure development, unified trade and economic policies as obtained in Europe and the

NS-M corridor, collapsing some of the multiple economic communities as well as harnessing the market size potential which determines the profitability of MNE'S as confirmed by Naveratti et al., (2004) should be the top priority of African leaders.

Thirdly, the extent to which infrastructure network impacts or influences the flow of FDI to Hi-tech, Manufacturing, Services and resources sector is further analysed in this study. The knowledge of the relevance of connectivity, choice, and integration as proxies for infrastructure network on various sectors to assist policy makers in decision making regarding FDI and other forms of investment into the sectors is the motivation for this further analysis. In general, infrastructure network measures(indicators) interacted differently with sector FDI's in Africa and across the different regions (SSA and Non-SSA). in Africa, Integration as a measure of closeness or the ease of being a potential destination from all location (to- movement) exhibited high significance in all sectors except resources sector with high impact on manufacturing sector (8.02%) and the choice, a measure of betweenness or the propensity of being a route to other locations (through-movement) exhibited high significance in all sectors except Hitech with high impact of manufacturing (5.83) also. These findings show that infrastructure network has a high significant impact on the manufacturing sector, a significant impact on service and Hi-tech and a minimal impact on the resource sector in Africa. furthermore, connectivity measure remained insignificant in all sectors. The insignificance of connectivity could be attributed to the dynamics in the data with respect to Africa, thus disaggregating Africa further to its regions may present a contrary result as seen in the earlier analysis. At regional level, connectivity measure of the infrastructure network is still not a determinant of FDI inflow in SSA whereas the integration measure is a significant determinant of FDI inflow to the manufacturing and service sectors with higher impact on the service sector.

This implies that an improvement in infrastructure network will greatly increase FDI inflow to the service and manufacturing sector in SSA either in the form of reduced transportation cost and time; or improvement in logistics services due to its high association with the delivery of both product/goods and raw materials in time and in good condition. Further analysis into sub-regions in SSA indicates variations in the impact of infrastructure network on FDI to the different sectors in the sub-region. While infrastructure network measure of connectivity has no significant impact on FDI inflow to all the sectors in Southern Africa, it can be said that infrastructure network has a significant impact on manufacturing, Hitech and Service sector in West Africa and on resource, manufacturing and Hi-tech sector in East Africa. This further confirms the earlier findings that connectivity is a significant determinant of FDI in Africa and further emphasises the high impact of infrastructure network on the inflow of FDI to manufacturing sector in Africa, and SSA Respectively. Therefore, a leap towards improving African economy and achieving Regional Economic Integration through increasing intra-regional trade and investment requires efforts toward enhancing infrastructure network as the focal point on the development agenda of cities and countries in Africa. This effort may include rehabilitation of existing road networks as well as upgrading or transformation of the road segment to provide the network effects as obtained in Europe (Crescenzi and Rodríguez-Pose,2012). This upgrade or transformation as obtained in Europe is gradual and involves the conversion of important road segment from ordinary road to high-quality road or motorway if the (benefits outweighs the cost) or construction of new roads with consideration of the network effect in new districts or cities.

On the other hand, in Non-SSA the infrastructure measure of connectivity is the only measure that is a determinant of FDI inflow to Hitech, resource, and service sectors respectively. However, this finding is counterintuitive since increasing connectivity leads to a decline of FDI in these sectors. This may be related to an indirect effect of the institutional burden due to its significant impact on FDI inflow to service and manufacturing sectors coupled with their peculiar desert terrain. This two can hinder infrastructure investment in this region. Furthermore, the significance of labour force to all the three sectors is an indication of efficiency seeking FDI or vertical FDI which benefit from factor cost saving (such as reduced transport cost, stable electricity, reduced labour cost, access to the raw material) rather than access to the market. This cost is increased with reduction in accessibility which may be as a result of limited number of road network with good quality since infrastructure network does not guaranty high quality, and increasing the connectivity of poor quality roads may impede the flow of people, goods and services to locations hence reducing investment in service activities, retail and

manufacturing. Mathivathany, (2015) states that highly networked roads with traffic flow exceeding the expected design capacity create congestions and damages to the section of road. This however if not adequately given attention may impede circulation and negatively impact the attractiveness of the surrounding location. Therefore, increasing connectivity must be done vis-a-vis improving the quality of road network. However, the interaction between these variables and the reason for declining FDI as a result of an increase in connectivity is a subject for further research.

The operative conclusion drawn from this study infrastructure development that enhances physical connectivity and encourages resource sharing is essential for rebalancing Africans growth potential as well as regional and global economic integration in view Africa's effort in diversifying its economy. Thus improved and well-developed infrastructure is a vital tool for FDI attraction and cross-border trade facilitation by enhancing physical connectivity of countries and regions. According to Bhattacharyay, (2010) to promote FDI and cross-border investment it is imperative to be connected through improved an integrated infrastructure. Since it is generally perceived that improvements in infrastructure endowments contribute to a better market integration of coastal, landlocked and lagging regions by enabling them to be at par with advanced and performing regions; improve the safety and security of workers and asset of MNE's in a given location in addition to providing accessibility in Africa. Similarly, is a necessity to create conditions in Lagos -Abidjan corridor that will facilitate and foster the formation of manufacturing and service sector activities taking advantage of the huge market size potential and relative integration of the road networks. Such conditions have the potency for diversifying the economy from tradition resource based FDI to non-extractive manufacturing, services and Hitech FDI and increase the potential for FDI attraction and regional effort in the provision of infrastructure with network effects such as road transport infrastructure, railroad and ICT infrastructure is of the essence. It can, therefore, be concluded that Global economic integration through the flow of FDI from one country to another is an end and infrastructure network is the means to achieving better Foreign Direct Investments, with varied level of impacts both in the developed and developing countries.

5.5 Recommendations

I. The findings from his study shows that for Africa to compete favourably in economic terms, recover from the multiple hit of shocks due to sharp decline in commodity prices, and inflation and to create an impact in the global value chain, then infrastructure network, market size, macroeconomic stability and institutions that are supportive of private sector development should be made should be made an integral part of economic and financial policies of investment location. The following policy recommendations are made:

II. As part of the strategy for regional and global integration through physical accessibility to economies in the region, coupled with a deeper understanding of the relevance of infrastructure to investment decisions of MNE''s, subsidiarity approach to infrastructure provisioning should be encouraged within and between regions. The emphasis should be on the quality of physical economic infrastructure with network effects such as road, rail, ICT and electricity.

III. Strong regional integration in terms of a common economic and trade policies as that of the European union and open borders (for ease of movement of people and goods), is required for intraregional trade and intracontinental infrastructure provisioning across countries bother

IV. For proper network effects, intraregional highways of transport and economic corridors should be supported by the host countries with major road connections of good quality so as to create the required positive externality of the intended section of road transport infrastructure.

V. Fiscal consolidation and economic reforms are required for Africa to strongly diversifying from the traditional resource-based economy to a more service and knowledge-based one as seen in the case of European and Asian countries

VI. Africa leaders can learn from the European council that full exploitation of the potential of the domestic market by developing infrastructure networks such as the Trans-European Transport Network (North Sea Mediterranean corridor and others), while efficiently utilising and updating the existing ones is required for a strong and competitive industrial base and this will facilitate movement, create employment and increase the efficiency of transportation and logistics chains

VII. As part of strategy for global and regional integration through infrastructure development, along with the improvement in the quality and network of roads, financing of railways, implementation of one-stop border post will enhance the competitiveness of L-A corridor and Africa

VIII. For LA corridor in west Africa to effectively benchmark the North Sea Mediterranean corridor in Europe, critical studies must be conducted in areas of strategic partnership and the institutions, strategies and processes of the Trans-European Transport Networks (TEN-T) and the European Union.

IX. the West African region characterised by ethnolinguistic duality (dichotomy between the French speaking and English speaking countries) as well as the multiplicity of institutions affiliated to either ECOWAS or WAEMU requires policies aimed at effective coordination among the heterogeneous network.

X. Member countries should strengthen the institutions and framework that fosters public infrastructure financing through corridor approach. This can be achieved by partnering with development financial institutions and banks such as the African Development Bank (AFDB), European Investment Bank (EIB)amongst others, to address these inefficiencies so that the deficit of infrastructure does not choke the expected growth of the economy

XI. countries with abundant natural resources should embark on Infrastructure for Resources Trade Agreement with countries that have the capacity to develop their infrastructure in exchange for their resources within a specified time frame and backed with good implementation and institutional framework.

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Annex 1 Descriptions and details on countries and divisions

List of sub Saharan African Countries

S/NO	Sub Saharan Africa	Strategic Location	Language	S/NO	Sub Saharan Africa	Strategic Location	Language
1	Angola	Coastal	others	20	Mali	Landlocked	French
2	Benin	Coastal	French	21	Mauritania	Coastal	French
3	Botswana	Landlocked	English	22	Mauritius	Coastal	French
4	Burkina Faso	Landlocked	French	23	Mozambique	Coastal	others
5	Burundi	Landlocked	French	24	Namibia	Coastal	English
6	Cameroon	Coastal	French	25	Nigeria	Coastal	English
7	Cape Verde	Coastal	French	26	Rwanda	Landlocked	others
8	Chad	Landlocked	French	27	Senegal	Coastal	French
9	Cote d'Ivoire	Coastal	French	28	Seychelles	Coastal	French
10	Ethiopia	Landlocked	others	29	Sierra Leone	Coastal	English
11	Gabon	Coastal	French	30	South Africa	Coastal	English
12	Gambia	Coastal	English	31	Swaziland	Landlocked	English
13	Ghana	Coastal	English	32	Tanzania	Coastal	English
14	Guinea	Coastal	French	33	Uganda	Landlocked	English
15	Kenya	Coastal	English	34	Zambia	Landlocked	English
16	Lesotho	Landlocked	English	35	Zimbabwe	Landlocked	English
17	Liberia	Coastal	English				
18	Madagascar	Landlocked	French				
19	Malawi	Landlocked	English				

Source: The World Bank Group (2016)

List of Non-Sub Saharan African Countries

S/NO	Non-Sub Saharan Africa	Strategic Location	Language
1	Algeria	Coastal	Arabic
2	Egypt	Coastal	Arabic
3	Libya	Coastal	Arabic
4	Morocco	Coastal	Arabic
5	Tunisia	Coastal	Arabic

Source: The World Bank Group (2016)

Regional Economic Community Africa

EAC	SADC
Burundi	Angola
Kenya	Botswana
Rwanda	Lesotho
Uganda	Madagascar
Tanzania	Malawi
	Mauritius
COMESA	Mozambique
Burundi	Namibia
Egypt	Seychelles
Eritrea	South Africa
Ethiopia	Swaziland
Kenya	Tanzania
Libya	Zambia
Madagascar	Zimbabwe
Malawi	
Mauritius	**UMA**
Rwanda	Algeria
Seychelles	Libya
Swaziland	Mauritania
Uganda	Morocco
Zambia	Tunisia
Zimbabwe	
	ECOWAS
ECCAS	Benin
Angola	Burkina Faso
Burundi	Cape Verde
Cameroon	Côte d'Ivoire
Central African Republic	Gambia
Chad	Ghana
Gabon	Guinea
Rwanda	Liberia
São Tomé /Principe	Mali
	Nigeria
	Senegal
	Sierra Leone

Source: African Union Commission (2016)

*** there exist 8 REC, however, 6 were selected for this study since member countries are member of either of the 6***

Sub Regions in Africa

SUBREGIONS	SUBREGIONS
Eastern Africa	**Western Africa**
Burundi	Benin
Eritrea	Burkina Faso
Ethiopia	Cape Verde
Kenya	Cote d'Ivoire
Madagascar	Gambia
Rwanda	Ghana
Seychelles	Guinea
Uganda	Liberia
Tanzania	Mali
	Mauritania
Middle Africa	Nigeria
Cameroon	Senegal
Central African Republic	Sierra Leone
Chad	
Gabon	**Northern Africa**
	Algeria
Southern Africa	Egypt
Angola	Libya
Botswana	Morocco
Lesotho	Tunisia
Malawi	
Mauritius	
Mozambique	
Namibia	
South Africa	
Swaziland	
Zambia	
Zimbabwe	

Source: United Nations Statistics Department (2012)

DUMMY VARIABLES IN EUROPE

Country	Average of REGION	Average of Subregion	Average of Reg_Econ_community	Average of Strategic_Location	Average of Corridors
Albania	3	7	8	2	4
Austria	3	6	7	1	4
Belgium	3	6	7	2	2
Bosnia-Herzeg	3	7	8	2	4
Bulgaria	3	7	7	1	4
Croatia	3	7	7	2	4
Cyprus	3	7	7	2	4
Czech Republic	3	7	7	1	4
Denmark	3	6	7	2	4
Estonia	3	7	7	2	4
Finland	3	6	7	2	4
France	3	6	7	2	2
Germany	3	6	7	2	2
Greece	3	6	7	2	4
Hungary	3	7	7	1	4
Iceland	3	6	7	2	4
Ireland	3	6	7	2	2
Italy	3	6	7	2	4
Latvia	3	7	7	2	4
Lithuania	3	7	7	2	4
Luxembourg	3	6	7	1	4
Macedonia FYR	3	7	7	1	4
Malta	3	7	7	2	4
Moldova	3	7	8	1	4
Montenegro	3	7	8	2	4
Netherlands	3	6	7	2	2
Portugal	3	6	7	2	4
Romania	3	7	7	2	4
Russia	3	7	8	2	4
Serbia	3	7	8	1	4
Slovakia	3	7	7	1	4
Slovenia	3	7	7	2	4
Spain	3	6	7	2	4
Sweden	3	6	7	2	4
Switzerland	3	6	8	1	4
Turkey	3	7	8	2	4
Ukraine	3	7	8	2	4
United Kingdo	3	6	7	2	2

DUMMY VARIABLES IN AFRICA

Country	Average of REGION	Average of Subregion	Average of Reg_Econ_community	Average of Corridors	Average of Strategic_Location
Algeria	2	3	3	3	2
Angola	1	2	2	3	2
Benin	1	1	1	1	2
Botswana	1	2	2	3	1
Burkina Faso	1	1	1	1	1
Burundi	1	5	4	3	1
Cameroon	1	5	4	3	2
Cape Verde	1	1	1	3	2
Chad	1	5	4	1	1
Cote d'Ivoire	1	1	1	1	2
Egypt	2	3	5	3	2
Ethiopia	1	4	5	3	1
Gabon	1	5	4	3	2
Gambia	1	1	1	1	2
Ghana	1	1	1	1	2
Guinea	1	1	1	1	2
Kenya	1	4	6	3	2
Lesotho	1	2	2	3	1
Liberia	1	1	1	1	2
Libya	2	3	3	3	2
Madagascar	1	4	2	3	2
Malawi	1	2	2	3	1
Mali	1	1	1	3	1
Mauritania	1	1	3	3	2
Mauritius	1	4	2	3	2
Morocco	2	3	3	3	2
Mozambique	1	2	2	3	2
Namibia	1	2	2	3	2
Nigeria	1	1	1	1	2
Rwanda	1	4	6	3	1
Senegal	1	1	1	3	2
Seychelles	1	4	2	3	2
Sierra Leone	1	1	1	1	2
South Africa	1	2	2	3	2
Swaziland	1	2	2	3	1
Tanzania	1	4	6	3	2
Tunisia	2	3	3	3	2
Uganda	1	4	6	3	1
Zambia	1	2	2	3	1
Zimbabwe	1	2	2	3	1

Measures Of Infrastructure Network

s/no	COUNTRY	latitude	longitude	connectivity	intergration	intergration R3	intergration R15	intergration R30	choice	choiceR3	choiceR15	choiceR30
1	Albania	41.15333	20.168331	2.02	0.02	0.333	0.251	0.173	9960000	6.2	238.44	1089.56
2	Algeria	28.03389	1.659626	2.03	0.021	0.863	0.374	0.244	12100000	0.863	0.374	0.244
3	Angola	-11.2027	17.873887	2.01	0.01	0.853	0.369	0.24	34700000	0.853	0.369	0.24
4	Austria	47.51623	14.550072	2.07	0.02	0.881	0.383	0.25	24500000	6.55	295.75	1544.78
5	Belgium	50.50389	4.469936	2.07	0.02	0.881	0.382	0.25	42000000	6.55	295.75	1544.78
6	Benin	9.30769	2.315834	2.02	0.021	0.858	0.373	0.243	39400000	0.858	0.373	0.243
7	Bosnia and H	43.91589	17.679076	2.03	0.02	0.864	0.375	0.244	18900000	6.25	246.1	1164.36
8	Botswana	-22.3285	24.684866	2.032	0.018	0.865	0.375	0.245	80400000	0.865	0.375	0.245
9	Bulgaria	42.73388	25.48583	2.05	0.02	0.871	0.377	0.246	26800000	6.36	259.1	0.241
10	Burkina Faso	12.23833	-1.561593	2.02	0.016	0.857	0.312	0.241	9.02E+08	0.857	0.312	0.241
11	Burundi	-3.37306	29.918886	2.001	0.012	0.853	0.369	0.24	12400000	0.853	0.369	0.24
12	Cameroon	7.369722	12.354722	2.01	0.0088	0.853	0.369	0.24	81400000	0.853	0.369	0.24
13	Cape Verde	15.12014	-23.605172									
14	Chad	15.45417	18.732207	2.02	0.021	0.857	0.352	0.244	4010000	0.857	0.352	0.244
15	Côte d'ivoire	7.539989	-5.54708	2.02	0.0165	0.857	0.372	0.242	7950000	0.857	0.372	0.242
16	Croatia	45.1	15.2	2.05	0.02	0.874	0.379	0.247	26400000	6.24	269.55	1335.7
17	Cyprus	35.12641	33.429859	2.04	0.081	0.863	0.382	0.259	366316	6.29	254.4	1116.86
18	Czech Republ	49.81749	15.472962	2.73	0.023	0.885	0.383	0.251	15400000	6.6	302.32	1624.62
19	Denmark	56.26392	9.501785	2.15	0.32	0.921	0.402	0.265	88900000	7.26	411.4	2593.47
20	Egypt	26.82055	30.802498	2.05	0.0134	0.872	0.378	0.247	28100000	0.872	0.378	0.247
21	Estonia	58.59527	25.013607	2.03	0.026	0.866	0.376	0.245	4350000	6.27	250.31	1177.11
22	Ethiopia	9.145	40.489673	2	0.0069	0.85	0.368	0.239	71600000	0.85	0.368	0.239
23	Finland	61.92411	25.748151	2.03	0.00156	0.865	0.375	0.234	2180000	6.251	246.51	1171.7
24	France	46.22764	2.213749	2.1	0.00000362	0.897	0.39	0.255	5260000	6.375	342.03	1952
25	Gabon	-0.80369	11.609444	2.001	0.015	0.851	0.369	0.24	17500000	0.851	0.369	0.24
26	Gambia	13.44318	-15.310139	2.01	0.296	0.369	0.241	0.422	469276	0.369	0.241	0.422
27	Germany	51.16569	10.451526	2.12	0.000192	0.908	0.395	0.259	9350000	7	369.58	2256
28	Ghana	7.946527	-1.023194	2.03	0.017	0.864	0.322	0.24	11200000	0.864	0.322	0.24
29	Greece	39.07421	21.824312	2.12	0.0019	0.908	0.394	0.258	24100000	7.001	369.58	2256
30	Guinea	9.945587	-9.696645	2.001	0.021	0.851	0.369	0.24	5120000	0.851	0.369	0.24
31	Hungary	47.16249	19.503304	2.079	0.026	0.888	0.386	0.254	13700000	6.67	313.2	1648
32	Iceland	64.96305	-19.020835	2.016	0.011	0.857	0.372	0.241	13200000	6.132	228.604	1022.54
33	Ireland	53.41291	-8.24389	2.07	0.024	0.884	0.384	0.251	9210000	6.58	299.76	1544.8
34	Italy	41.87194	12.56738	2.06	0.00019	0.876	0.38	0.248	2790000	6.46	279.06	1437.72
35	Kenya	-0.02356	37.906193	2.01	0.014	0.854	0.37	0.24	14000000	0.854	0.37	0.24
36	Latvia	56.87964	24.603189	2.06	0.03	0.876	0.381	0.356	4830000	6.45	276.6	1403.22
37	Lesotho	-29.61	28.233608	2.02	0.022	0.858	0.373	0.166	5060000	0.858	0.373	0.166
38	Liberia	6.428055	-9.429499	2.01	0.02	0.853	0.369	0.24	2210000	0.853	0.369	0.24
39	Libya	26.3351	17.228331	2.04	0.013	0.869	0.376	0.245	23500000	0.869	0.376	0.245
40	Lithuania	55.16944	23.881275	2.07	0.03	0.881	0.383	0.25	4060000	6.53	289.2	1523
41	Luxembourg	49.81527	6.129583	2.08	0.04	0.889	0.387	0.245	1900000	6.69	315.75	1741.41
42	Macedonia F	41.60864	21.745275	2.05	0.02	0.867	0.376	0.245	7640000	6.3	247.38	1144.68
43	Madagascar	-18.7669	46.869107	2.01	0.013	0.852	0.369	0.241	44800000	0.852	0.369	0.241
44	Malawi	-13.2543	34.301525	2.01	0.01	0.852	0.369	0.239	31000000	0.852	0.369	0.239
45	Mali	17.57069	-3.996166	2.01	0.015	0.854	0.37	0.241	11000000	0.854	0.37	0.241
46	Malta	35.9375	14.375416	2.07	0.046	0.883	0.385	0.253	25599	6.54	297.44	1460.9
47	Mauritania	21.00789	-10.940835	2.01	0.015	0.852	0.369	0.241	5170000	0.852	0.369	0.241
48	Mauritius	-20.3484	57.552152	2.12	0.12	0.903	0.393	0.259	28016.9	0.903	0.393	0.259
49	Moldova	47.41163	28.369885	2.03	0.021	0.866	0.375	0.244	8440	6.28	252.63	1216.45
50	Montenegro	42.70868	19.37439	2.02	0.017	0.861	0.373	0.248	8290000	6.17	237.87	1090.01
51	Morocco	31.7917	-7.09262	2.02	0.01297	0.861	0.373	0.243	28200000	0.861	0.373	0.243
52	Mozambique	-18.6657	35.529562	2.01	0.01	0.854	0.37	0.24	56700000	0.854	0.37	0.24
53	Namibia	-22.9576	18.49041	2.02	0.21	0.859	0.373	0.243	81700000	0.859	0.373	0.243
54	Netherlands	52.13263	5.291266	2.173	0.0385	0.933	0.407	0.268	7220000	7.431	449.21	2954.27
55	Nigeria	9.081999	8.675277	2.03	0.012	0.867	0.354	0.245	57300000	0.867	0.354	0.245
56	Portugal	39.39987	-8.224454	2.07	0.025	0.885	0.384	0.251	20900000	6.6	300.475	0.371
57	Romania	45.94316	24.96676	2.03	0.001	0.863	0.374	0.243	1880000	6.23	243.9	1147.2
58	Russia	61.52401	105.31876	2.02	0.032	0.862	0.374	0.243	1590000	6.22	243.81	1156.29
59	Rwanda	-1.94028	29.873888	2.01	0.01	0.853	0.369	0.241	13600000	0.853	0.369	0.241
60	Senegal	14.4974	-14.452362	2.01	0.03	0.86	0.371	0.241	3810000	0.86	0.371	0.241
61	Serbia	44.01652	21.005859	2.041	0.00166	0.8693	0.377	0.246	2790000	6.35	257.844	1237.48
62	Seychelles	-4.67957	55.491977									
63	Sierra Leone	8.460555	-11.779889	2.01	0.023	0.853	0.369	0.24	1020000	0.853	0.369	0.24
64	Slovakia	48.66903	19.699024	2.081	0.0199	0.887	0.386	0.253	2300000	6.697	325.58	1770.44
65	Slovenia	46.15124	14.995463	2.08	0.023	0.887	0.0386	0.252	5840000	6.66	302.35	1578.36
66	South Africa	-30.5595	22.937506	2.06	0.0021	0.877	0.381	0.248	79000000	0.877	0.381	0.248
67	Spain	40.46367	-3.74922	2.07	0.0000233	0.886	0.385	0.252	2350000	6.623	308.59	1643.63
68	Swaziland	-26.5225	31.465866	2.03	0.22	0.863	0.375	0.244	3110000	0.863	0.375	0.244
69	Sweden	60.12816	18.643501	2.08	0.0000233	0.3333	0.242	0.251	35400000	6.63	308.59	1643.63
70	Switzerland	46.81819	8.227512	2.09	0.022	0.893	0.388	0.254	14300000	6.75	333.99	1935.79
71	Tanzania	-6.36903	34.888822	2.01	0.0097	0.852	0.369	0.24	57600000	0.852	0.369	0.24
72	Tunisia	33.88692	9.537499	2.04	0.0152	0.87	0.377	0.246	17700000	0.87	0.377	-0.246
73	Turkey	38.96375	35.243322	2.03	0.00014	0.866	0.376	0.244	1210000	6.23	249.15	1168.82
74	Uganda	1.373333	32.290275	2.02	0.017	0.852	0.369	0.24	12000000	0.852	0.369	0.24
75	Ukraine	48.37943	31.16558	2.05	0.0159	0.873	0.379	0.165	65460000	6.39	269.73	1364.61
76	United Kingd	55.37805	-3.435973	2.09	0.000103	0.893	0.388	0.253	4830000	6.733	323.75	1819.94
77	Zambia	-13.1339	27.849332	2.01	0.013	0.851	0.369	0.24	47300000	0.851	0.369	0.24
78	Zimbabwe	-19.0154	29.154857	2.03	0.0166	0.864	0.375	0.241	22600000	0.864	0.375	0.241

Source: Space Syntax Analysys From Dethmapx

ANNEX 2 Results of Statistical Analysis

Table2.1 Connectivity And Total Fdi In Europe

Dependant Var:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Total FDI	EUR	EUR	EUR	EUR	EUR	EUR	EUR	EUR
connectivity	2.02	1.90	1.46*	1.42	1.29*	1.40*	1.62*	1.78*
	(1.07)	(1.00)	(0.75)	(0.74)	(0.64)	(0.67)	(0.73)	(0.78)
GCI_MEC		0.22	0.21	0.22	0.22	0.22	0.21	0.22
		(0.12)	(0.12)	(0.12)	(0.13)	(0.13)	(0.13)	(0.13)
logGDP			0.12**	0.14**	0.17**	0.16**	0.18***	0.18***
			(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Total Population				-0.00	0.00	0.00	-0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					-0.32*	-0.32*	-0.30	-0.30
					(0.15)	(0.16)	(0.15)	(0.16)
LANDLOCKED						0.00		0.00
						(.)		(.)
COASTAL						0.10		0.13
						(0.29)		(0.29)
REC=E.U							0.00	0.00
							(.)	(.)
REC=NON-EU							0.46	0.48
							(0.48)	(0.47)
Constant	3.41	2.50	0.29	0.07	1.14	0.91	-0.15	-0.49
	(2.32)	(2.21)	(2.13)	(2.10)	(2.09)	(2.10)	(2.22)	(2.26)
Observations	331	331	330	330	323	323	323	323
Adjusted R2	0.02	0.07	0.37	0.38	0.65	0.64	0.60	0.59

Standard errors in parentheses *p < 0.05, **p < 0.01, ***p < 0.001

GCI_MEC = Macro Economic Environment Catalyst Index **GCI_InstB = institutional burden **

TABLE2.2 CHOICE AND TOTAL FDI IN EASTERN EUROPE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Eastern Eur	logT_FDI	logT_FDI	logT_FDI	logT_FDI	logT_FDI	logT_FDI	logT_FDI
choiceN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC		0.34*	0.38*	0.39*	0.41*	0.40*	0.35
		(0.16)	(0.17)	(0.16)	(0.18)	(0.18)	(0.19)
logGDP			0.11	0.17	0.23	0.22	0.31**
			(0.06)	(0.11)	(0.13)	(0.14)	(0.11)
Total Population				-0.00	-0.00	-0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					-0.51**	-0.47*	-0.53**
					(0.20)	(0.22)	(0.18)
LANDLOCKED						0.00	
						(.)	
COASTAL						-0.23	
						(0.38)	
EU							0.00
							(.)
NON EU							0.44
							(0.56)
Constant	7.19***	5.38***	2.49	1.04	2.07	2.28	0.26
	(0.41)	(0.99)	(1.72)	(2.77)	(3.14)	(3.17)	(3.21)
Observations	189	189	188	188	181	181	181
Adjusted R2	0.03	0.15	0.36	0.33	0.66	0.61	0.70

TABLE2.3 CONNECTIVITY AND TOTAL FDI IN AFRICA

Dependent Var:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log Total FDI	AFR	AFR	AFR	AFR	AFR	AFR	AFR
connectivity	17.45	15.78	3.95	4.72	5.43	4.11	1.64
	(20.61)	(20.20)	(10.50)	(10.40)	(12.45)	(12.77)	(12.77)
GCI_MEC		0.19*	0.13	0.13	0.19*	0.19	0.22*
		(0.09)	(0.09)	(0.09)	(0.10)	(0.10)	(0.11)
logGDP			0.58***	0.52***	0.53***	0.50**	0.51***
			(0.12)	(0.13)	(0.15)	(0.15)	(0.15)
Total Population				0.00	0.00	0.00	0.00
				(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.41*	0.42*	0.37
					(0.18)	(0.18)	(0.20)
LANDLOCKED						0.00	
						(.)	
COASTAL						0.47	
						(0.40)	
ECOWAS							0.00
							(.)
SADC							0.60
							(0.53)
AMU							0.25
							(0.87)
ECCAS							-0.53
							(0.61)
COMESA							0.96
							(1.05)
EAC							0.82*
							(0.41)
Constant	-29.48	-27.11	-16.52	-16.73	-20.63	-17.54	-12.76
	(41.59)	(40.71)	(20.76)	(20.41)	(24.14)	(24.83)	(24.74)
Observations	283	283	281	281	246	246	246
Adjusted R2	0.05	0.08	0.60	0.62	0.60	0.58	0.63

Standard errors in parentheses *p < 0.05,**p < 0.01, ***p < 0.001

GCI_MEC = Macro Economic Environment Catalyst Index **GCI_InstB = institutional burden **

TABLE2.4 INTEGRATION AND TOTAL FDI IN EUROPE

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Total FDI	EUR	EUR	EUR	EUR	EUR	EUR	EUR	EUR
Integration	-5.70	-6.04	-6.00*	-6.04*	-5.39*	-5.45*	-5.14*	-5.20*
	(3.57)	(3.52)	(2.99)	(2.99)	(2.54)	(2.58)	(2.49)	(2.53)
GCI_MEC		0.23	0.23	0.23	0.24	0.24	0.23	0.24
		(0.12)	(0.13)	(0.13)	(0.14)	(0.14)	(0.14)	(0.14)
logGDP			0.13**	0.15**	0.18**	0.18**	0.19***	0.19***
			(0.04)	(0.05)	(0.06)	(0.06)	(0.06)	(0.05)
Total Population				-0.00	-0.00	-0.00	-0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					-0.31*	-0.31*	-0.29	-0.29
					(0.16)	(0.16)	(0.16)	(0.16)
LANDLOCKED						0.00		0.00
						(.)		(.)
COASTAL						0.07		0.07
						(0.28)		(0.28)
REC=EU							0.00	0.00
							(.)	(.)
REC=NON EU							0.32	0.32
							(0.47)	(0.47)
Constant	7.78***	6.56***	3.14*	2.82*	3.40*	3.42*	2.96	2.97
	(0.24)	(0.69)	(1.27)	(1.35)	(1.71)	(1.69)	(1.75)	(1.74)
Observations	331	331	330	330	323	323	323	323
Adjusted R2	0.05	0.10	0.42	0.42	0.65	0.66	0.63	0.63

Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0

TABLE2.5 INTEGRATION AND TOTAL FDI IN AFRICA

Dependent var:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(SSA)	(N-SSA)
Log Total FDI	AFR	AFR	AFR	AFR	AFR	AFR	AFR	logT_FDI	logT_FDI	logT_FDI
Integration	-7.48***	-7.37***	-4.12*	-3.79*	-4.16**	-4.95**	-4.91*	-8.35**	-7.72**	23.33
	(2.13)	(1.99)	(1.70)	(1.58)	(1.45)	(1.52)	(2.04)	(2.91)	(2.72)	(88.70)
GCI_MEC		0.20*	0.14	0.13	0.20	0.18	0.23*	0.21	0.09	0.09
		(0.09)	(0.09)	(0.09)	(0.10)	(0.10)	(0.11)	(0.12)	(0.13)	(0.24)
logGDP			0.56***	0.51***	0.53***	0.48***	0.50***	0.51***	0.50**	-0.64
			(0.12)	(0.12)	(0.14)	(0.14)	(0.14)	(0.14)	(0.15)	(0.59)
Total Population				0.00	0.00	0.00	0.00	0.00	0.00	0.00*
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.44*	0.46**	0.42*	0.41*	0.22	1.09*
					(0.18)	(0.18)	(0.20)	(0.19)	(0.20)	(0.44)
LANDLOCKED						0.00		0.00	0.00	0.00
						(.)		(.)	(.)	(.)
COASTAL						0.60		0.85*	0.67*	0.00
						(0.41)		(0.34)	(0.33)	(.)
ECOWAS							0.00	0.00	0.00	0.00
							(.)	(.)	(.)	(.)
SADC							0.65	1.13*	1.05*	0.00
							(0.51)	(0.46)	(0.46)	(.)
AMU							0.09	0.06	-1.27**	15.24
							(0.87)	(0.85)	(0.39)	(11.16)
ECCAS							-0.72	-0.34	-0.40	0.00
							(0.63)	(0.59)	(0.57)	(.)
COMESA							0.85	1.18	0.08	13.09
							(1.12)	(0.82)	(0.36)	(11.09)
EAC							0.65	0.99*	0.94*	0.00
							(0.45)	(0.45)	(0.43)	(.)
Constant	6.06***	4.99***	-8.01**	-6.94*	-9.53**	-8.80**	-9.07**	-9.89**	-8.20*	0.00
	(0.31)	(0.61)	(2.80)	(2.83)	(3.12)	(2.96)	(3.15)	(3.12)	(3.50)	(.)
Observations	283	283	281	281	246	246	246	246	205	41
Adjusted R2	0.08	0.11	0.59	0.61	0.59	0.56	0.63	0.67	0.72	0.91

TABLE2.6 CHOICE AND TOTAL FDI IN EUROPE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Europe	logT_FDI	logT_FDI	logT_FDI	logT_FDI	logT_FDI	logT_FDI	logT_FDI	logT_FDI
choiceN	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC		0.22	0.22	0.22	0.22	0.23	0.19	0.19
		(0.12)	(0.13)	(0.13)	(0.13)	(0.14)	(0.13)	(0.13)
logGDP			0.13**	0.14**	0.18**	0.18**	0.20***	0.20***
			(0.04)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)
Total Population				-0.00	0.00	0.00	-0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					-0.34*	-0.34*	-0.37*	-0.36*
					(0.16)	(0.16)	(0.16)	(0.16)
LANDLOCKED						0.00		0.00
						(.)		(.)
COASTAL						0.04		0.04
						(0.29)		(0.28)
EU							0.00	0.00
							(.)	(.)
Non-EU							0.11	0.11
							(0.46)	(0.46)
Constant	7.60***	6.43***	3.10*	2.84*	3.45*	3.47*	3.23	3.26
	(0.31)	(0.71)	(1.26)	(1.33)	(1.70)	(1.68)	(1.80)	(1.78)
Observations	331	331	330	330	323	323	323	323
Adjusted R2								

TABLE2.7 CHOICE AND TOTAL FDI IN EASTERN EUROPE

Western Europe	(1) logT_FDI	(2) logT_FDI	(3) logT_FDI	(4) logT_FDI	(5) logT_FDI	(6) logT_FDI	(7) logT_FDI
ChoiceN	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC		0.11	0.05	0.05	0.06	0.10	0.06
		(0.15)	(0.14)	(0.14)	(0.13)	(0.14)	(0.14)
logGDP			0.18	0.17	0.16	0.15	0.16
			(0.10)	(0.11)	(0.11)	(0.10)	(0.10)
Total Population				0.00	0.00	0.00	0.00
				(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					-0.11	-0.05	-0.10
					(0.28)	(0.30)	(0.28)
LANDLOCKED						0.00	
						(.)	
COASTAL						0.94	
						(0.72)	
EU							0.00
							(.)
NON EU							-0.03
							(0.50)
Constant	8.22***	7.61***	3.16	3.33	4.02	3.10	4.06
	(0.43)	(0.66)	(2.62)	(2.78)	(3.46)	(3.09)	(3.36)
Observations	142	142	142	142	142	142	142
Adjusted R2	0.06	0.060	0.52	0.58	0.64	0.54	0.62

TABLE2.7 CHOICE AND TOTAL FDI IN AFRICA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(SSA)	(NSSA)
Africa	Log T_FDI	Log T_FDI	Log T_FDI	Log T_FDI	Log T_FDI	Log T_FDI	Log T_FDI	logT_FDI	Log T_FDI
choiceN	-0.00	-0.00***	-0.00***	-0.00***	-0.00***	-0.00*	-0.00*	-0.00*	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
logGDP		0.62***	0.60***	0.54***	0.55***	0.52***	0.52***	0.50**	-0.68
		(0.12)	(0.12)	(0.13)	(0.15)	(0.15)	(0.15)	(0.16)	(0.61)
GCI_MEC			0.13	0.13	0.19	0.18	0.22*	0.09	0.09
			(0.09)	(0.09)	(0.10)	(0.10)	(0.11)	(0.11)	(0.24)
Total Population				0.00	0.00	0.00	0.00	0.00	0.00**
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.40*	0.41*	0.37	0.17	1.12**
					(0.18)	(0.18)	(0.20)	(0.21)	(0.43)
LANDLOCKED						0.00			0.00
						(.)			(.)
COASTAL						0.42			0.00
						(0.41)			(.)
ECOWAS							0.00	0.00	0.00
							(.)	(.)	(.)
SADC							0.55	0.55	0.00
							(0.52)	(0.52)	(.)
AMU							0.15	-1.14**	16.83
							(0.87)	(0.39)	(12.92)
ECCAS							-0.63	-0.64	0.00
							(0.62)	(0.64)	(.)
COMESA							0.88	-0.42	14.64
							(1.05)	(0.29)	(12.85)
EAC							0.72	0.72	0.00
							(0.41)	(0.40)	(.)
Constant	5.85***	-8.65**	-8.91**	-7.59**	-9.99**	-9.54**	-9.53**	-7.65	0.00
	(0.29)	(2.86)	(2.74)	(2.93)	(3.32)	(3.30)	(3.41)	(3.78)	(.)
Observations	283	281	281	281	246	246	246	205	41
Adjusted R2	0.01	0.64	0.62	0.64	0.62	0.60	0.64	0.70	0.93

Standard errors in parentheses * ***p* < 0.05,** ** ***p* < 0.01,** *** ***p* < 0.001** ***GCI_MEC = Macro Economic Environment Catalyst*** ***GCI_InstB = institutional burden** **

TABLE2.8 INTEGRATION AND HITECH FDI IN AFRICA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AFRICA	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech
Integration	-9.74***	-9.64**	-3.92	-3.96	-4.35*	-4.88*	-2.81	-3.49
	(2.17)	(2.95)	(2.14)	(2.21)	(1.76)	(2.19)	(1.92)	(2.34)
GCI_MEC		0.27	-0.06	-0.05	-0.20	-0.20	-0.24	-0.23
		(0.22)	(0.17)	(0.18)	(0.18)	(0.18)	(0.21)	(0.21)
logGDP			0.79***	0.78***	0.83***	0.76***	0.79***	0.75***
			(0.11)	(0.15)	(0.13)	(0.15)	(0.15)	(0.16)
Total Population				-0.00	-0.00	0.00	-0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.09	0.12	-0.07	-0.02
					(0.15)	(0.17)	(0.16)	(0.19)
LANDLOCKED						0.00		0.00
						(.)		(.)
COASTAL						0.41		0.34
						(0.41)		(0.47)
ECOWAS							0.00	0.00
							(.)	(.)
SADC							-0.17	-0.02
							(0.43)	(0.50)
AMU							0.58	0.58
							(0.74)	(0.74)
ECCAS							1.45**	1.53**
							(0.50)	(0.48)
COMESA							0.74	0.87
							(0.53)	(0.48)
EAC							0.00	0.13
							(0.57)	(0.67)
Constant	4.11***	2.65*	-14.78***	-14.69***	-15.22***	-14.00***	-13.67***	-13.13***
	(0.31)	(1.35)	(2.43)	(2.90)	(2.55)	(2.87)	(3.77)	(3.76)
Observations	137	137	137	137	127	127	127	127
Adjusted R2	0.07	0.08	0.44	0.44	0.56	0.56	0.66	0.66

TABLE2.9 CHOICE AND HITECH FDI IN AFRICA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
AFRICA	logFD Hitech	logFDI Hitech	logFDI Hitech	logFDI Hitech	logFDI Hitech	logFDI Hitech	logFDI Hitech
choiceN	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC		0.26	-0.07	-0.05	-0.22	-0.22	-0.24
		(0.24)	(0.17)	(0.18)	(0.16)	(0.17)	(0.22)
logGDP			0.84***	0.82***	0.88***	0.84***	0.84***
			(0.12)	(0.15)	(0.13)	(0.16)	(0.16)
totalPopulation				0.00	0.00	0.00	-0.00
				(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.09	0.12	-0.04
					(0.16)	(0.18)	(0.15)
lANDLOCKED						0.00	
						(.)	
COASTAL						0.26	
						(0.42)	
ECOWAS							0.00
							(.)
SADC							-0.01
							(0.54)
AMU							0.57
							(0.80)
ECCAS							1.74*
							(0.69)
COMESA							0.78
							(0.47)
EAC							0.05
							(0.53)
Constant	3.61***	2.25	-15.87***	-15.54***	-16.34***	-15.65***	-14.93***
	(0.41)	(1.43)	(2.37)	(2.90)	(2.42)	(2.80)	(4.14)
Observations	137	137	137	137	127	127	127
Adjusted R2	0.04	0.04	0.43	0.43	0.55	0.55	0.66

TABLE2.10 CONNECTIVITY AND HITECH FDI IN AFRICA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AFRICA	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech	FDI Hitech
connectivity	21.95	19.41	2.80	2.84	7.69	7.05	10.24	9.73
	(16.85)	(17.18)	(8.39)	(9.19)	(9.79)	(10.16)	(8.60)	(8.93)
GCI_MEC		0.24	-0.07	-0.06	-0.21	-0.21	-0.25	-0.24
		(0.24)	(0.18)	(0.19)	(0.19)	(0.19)	(0.22)	(0.22)
logGDP			0.80***	0.79***	0.80***	0.75***	0.73***	0.71***
			(0.12)	(0.17)	(0.18)	(0.19)	(0.16)	(0.18)
totalPopulation				0.00	0.00	0.00	-0.00	0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.11	0.13	-0.07	-0.04
					(0.17)	(0.19)	(0.16)	(0.18)
LANDLOCKED						0.00		0.00
						(.)		(.)
COASTAL						0.30		0.19
						(0.43)		(0.48)
ECOWAS							0.00	0.00
							(.)	(.)
SADC							-0.27	-0.19
							(0.40)	(0.47)
AMU							0.58	0.58
							(0.77)	(0.78)
ECCAS							1.61**	1.66***
							(0.50)	(0.49)
COMESA							0.69	0.76
							(0.41)	(0.41)
EAC							0.13	0.20
							(0.55)	(0.65)
Constant	-40.55	-36.73	-20.83	-20.63	-30.14	-28.18	-33.00*	-31.88
	(34.00)	(34.25)	(16.02)	(16.74)	(17.17)	(18.22)	(15.88)	(16.49)
Observations	137	137	137	137	127	127	127	127
Adjusted R2	0.03	0.04	0.43	0.43	0.57	0.56	0.69	0.69

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ ***GCI_MEC = Macro Economic Environment Catalyst** **GCI_InstB = institutional burden ***

TABLE2.11 CHOICE AND SERVICE FDI IN AFRICA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Africa	LogFDI serv	logFDI serv	logFDI serv	logFDI serv	logFDI serv	logFDI serv	logFDI serv
choiceN	-0.00**	-0.00**	-0.00***	-0.00***	-0.00***	-0.00**	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_MEC		0.23	0.09	0.09	0.06	0.04	0.05
		(0.15)	(0.14)	(0.14)	(0.12)	(0.13)	(0.13)
logGDP			0.62***	0.61***	0.62***	0.59***	0.61***
			(0.10)	(0.12)	(0.14)	(0.13)	(0.14)
totalPopulation				0.00	0.00	0.00	0.00
				(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.33	0.35	0.25
					(0.20)	(0.20)	(0.23)
LANDLOCKED							
						0.00	
						(.)	
COASTAL						0.48	
						(0.29)	
ECOWAS							0.00
							(.)
SADC							-0.41
							(0.40)
AMU							0.19
							(0.67)
ECCAS							-0.78
							(0.53)
COMESA							0.07
							(0.77)
EAC							0.48
							(0.40)
Constant	4.51***	3.30***	-10.62***	-10.42***	-11.87***	-11.49***	-10.99***
	(0.24)	(0.87)	(2.14)	(2.62)	(3.14)	(2.99)	(3.27)
Observations	255	255	253	253	226	226	226
Adjusted R2	0.02	0.10	0.63	0.64	0.60	0.61	0.63

Standard errors in parentheses * ***p* < 0.05,** ** ***p* < 0.01,** *** ***p* < 0.001** ***GCI_MEC = Macro Economic Environment Catalyst*** ***GCI_InstB = institutional burden ***

TABLE2.12 INTEGRATION AND SERVICE FDI IN AFRICA

AFRICA	(1) FDI serv	(2) FDI serv	(3) FDI serv	(4) FDI serv	(5) FDI serv	(6) FDI serv	(7) FDI serv	(8) FDI serv
Intergration	-4.89***	-4.75**	-1.29	-1.29	-1.96	-2.81	-1.24	-2.21
	(1.44)	(1.55)	(3.14)	(3.13)	(2.95)	(2.75)	(2.75)	(2.76)
GCI_MEC		0.23	0.10	0.10	0.07	0.04	0.05	0.04
		(0.15)	(0.14)	(0.14)	(0.12)	(0.12)	(0.13)	(0.13)
logGDP			0.60***	0.60***	0.61***	0.56***	0.60***	0.55***
			(0.11)	(0.13)	(0.14)	(0.14)	(0.15)	(0.14)
Total Population				0.00	0.00	0.00	0.00	0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.36	0.39	0.27	0.31
					(0.20)	(0.20)	(0.22)	(0.22)
LANDLOCKED						0.00		0.00
						(.)		(.)
COASTAL						0.64*		0.63*
						(0.30)		(0.30)
ECOWAS							0.00	0.00
							(.)	(.)
SADC							-0.30	-0.11
							(0.42)	(0.40)
AMU							0.29	0.20
							(0.68)	(0.67)
ECCAS							-0.70	-0.52
							(0.57)	(0.68)
COMESA							0.14	0.37
							(0.81)	(0.66)
EAC							0.57	0.75
							(0.43)	(0.39)
Constant	4.62***	3.41***	-10.29***	-10.24***	-11.74***	-11.04***	-10.97**	-10.48**
	(0.27)	(0.89)	(2.44)	(2.81)	(3.24)	(3.05)	(3.37)	(3.22)
Observations	255	255	253	253	226	226	226	226
Adjusted R2	0.04	0.11	0.61	0.61	0.58	0.58	0.62	0.62

TABLE2.13 CONNECTIVITY AND SERVICE FDI IN AFRICA

	(1) FDI serv	(2) FDI serv	(3) FDI serv	(4) FDI serv	(5) FDI serv	(6) FDI serv	(7) FDI serv	(8) FDI serv
connectivity	17.55	15.64	4.47	4.60	5.95	4.29	8.37	6.53
	(16.95)	(16.75)	(6.81)	(6.88)	(8.87)	(9.01)	(8.38)	(8.86)
GCI_MEC		0.22	0.09	0.09	0.06	0.04	0.03	0.02
		(0.16)	(0.14)	(0.14)	(0.12)	(0.13)	(0.13)	(0.13)
logGDP			0.60***	0.59***	0.60***	0.57***	0.58***	0.56***
			(0.10)	(0.12)	(0.14)	(0.14)	(0.14)	(0.13)
Total Population				0.00	0.00	0.00	0.00	0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.33	0.35	0.24	0.27
					(0.20)	(0.19)	(0.22)	(0.22)
LANDLOCKED						0.00		0.00
						(.)		(.)
COASTAL						0.53		0.50
						(0.29)		(0.30)
ECOWAS							0.00	0.00
							(.)	(.)
SADC							-0.42	-0.25
							(0.43)	(0.43)
AMU							0.30	0.27
							(0.66)	(0.65)
ECCAS							-0.58	-0.42
							(0.52)	(0.61)
COMESA							0.09	0.29
							(0.66)	(0.57)
EAC							0.65	0.81*
							(0.40)	(0.37)
Constant	-31.04	-28.32	-19.34	-19.40	-23.59	-19.90	-27.41	-23.57
	(34.18)	(33.56)	(13.20)	(13.25)	(16.84)	(17.00)	(16.29)	(16.97)
Observations	255	255	253	253	226	226	226	226
Adjusted R2	0.09	0.14	0.62	0.62	0.60	0.61	0.65	0.66

Standard errors in parentheses * ***p* < 0.05,** ** ***p* < 0.01,** *** ***p* < 0.001** ***GCI_MEC = Macro Economic Environment Catalyst*** ***GCI_InstB = institutional burden ****

TABLE2.13 CONNECTIVITY AND SERVICE FDI IN AFRICA

	(1) logT_FDI	(2) logT_FDI	(3) logT_FDI	(4) logT_FDI	(5) logT_FDI	(6) logT_FDI	(7) logT_FDI	(SSA) logT_FDI	(NSSA) logT_FDI
connectivity	17.45	15.78	3.95	4.72	5.43	4.11	1.64	-5.86	49.74
	(20.61)	(20.20)	(10.50)	(10.40)	(12.45)	(12.77)	(12.77)	(9.69)	(69.95)
GCI_MEC		0.19*	0.13	0.13	0.19*	0.19	0.22*	0.08	0.10
		(0.09)	(0.09)	(0.09)	(0.10)	(0.10)	(0.11)	(0.11)	(0.23)
logGDP			0.58***	0.52***	0.53***	0.50**	0.51***	0.47**	-0.86
			(0.12)	(0.13)	(0.15)	(0.15)	(0.15)	(0.17)	(0.80)
Total Population				0.00	0.00	0.00	0.00	0.00	0.00
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB					0.41*	0.42*	0.37	0.20	1.17**
					(0.18)	(0.18)	(0.20)	(0.21)	(0.42)
LANDLOCKED						0.00		0.00	0.00
						(.)		(.)	(.)
COASTAL						0.47		0.61	0.00
						(0.40)		(0.34)	(.)
ECOWAS							0.00	0.00	0.00
							(.)	(.)	(.)
SADC							0.60	0.89	0.00
							(0.53)	(0.50)	(.)
AMU							0.25	-1.24**	-81.21
							(0.87)	(0.40)	(128.30)
ECCAS							-0.53	-0.41	0.00
							(0.61)	(0.60)	(.)
COMESA							0.96	0.03	-86.41
							(1.05)	(0.42)	(132.80)
EAC							0.82*	0.98*	0.00
							(0.41)	(0.44)	(.)
Constant	-29.48	-27.11	-16.52	-16.73	-20.63	-17.54	-12.76	4.25	0.00
	(41.59)	(40.71)	(20.76)	(20.41)	(24.14)	(24.83)	(24.74)	(19.02)	(.)
Observations	283	283	281	281	246	246	246	205	41
Adjusted R2	0.05	0.08	0.60	0.62	0.60	0.58	0.63	0.69	0.93

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ ***GCI_MEC = Macro Economic Environment Catalyst*** ***GCI_InstB = institutional burden ****

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	(W/A) logT_FDI	(S/A) logT_FDI	(N/A) logT_FDI	(E/A) logT_FDI
connectivity	67.92*	1.76	10.19	-14.60***
	(27.20)	(22.73)	(40.67)	(2.59)
GCI_MEC	0.29	0.04	0.00	-0.23
	(0.26)	(0.16)	(0.25)	(0.37)
logGDP	0.96***	0.10	0.52	0.57**
	(0.15)	(0.19)	(0.45)	(0.22)
totalPopulation	-0.00	0.00	0.00	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	0.85***	0.21	0.99**	0.03
	(0.24)	(0.54)	(0.34)	(0.14)
Constant	-159.01**	-1.51	-32.08	23.52**
	(52.29)	(46.92)	(83.40)	(8.01)
Observations	55	65	47	58
Adjusted R2	0.84	0.70	0.79	0.82

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ ***GCI_MEC = Macro Economic Environment Catalyst*** ***GCI_InstB = institutional burden ****

Table 4. connectivity and FDI to manufacturing sector in African sub regions

	(W/A) logFDI_Man	(S/A) logFDI_Man	(N/A) logFDI_Man	(E/A) logFDI_Man
connectivity	34.75	-17.96	2.87	-0.25
	(53.20)	(9.73)	(37.34)	(3.31)
GCI_MEC	-0.03	-0.33	-0.02	-0.44
	(0.68)	(0.23)	(0.32)	(0.66)
logGDP	0.81	0.03	-0.02	0.82*
	(0.53)	(0.15)	(0.52)	(0.33)
totalPopulation	0.00	0.00*	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	0.24	0.01	0.91***	0.05
	(0.46)	(0.75)	(0.26)	(0.15)
Constant	-85.54	41.08*	-4.51	-12.47
	(100.23)	(20.55)	(82.39)	(11.34)
Observations	33	58	42	52
Adjusted R2				

Standard errors in parentheses * p < 0.05, ** p < 0.01, *** p < 0.001 **GCI_MEC = Macro Economic Environment Catalyst** **GCI_InstB = institutional burden *

Connectivity and service sector FDI

	(W/A) logFDI_serv	(S/A) logFDI_serv	(N/A) logFDI_serv	(E/A) logFDI_serv
connectivity	62.87*	37.27	0.69	-6.89*
	(27.47)	(21.44)	(29.91)	(3.29)
GCI_MEC	-0.08	0.28	-0.20	-0.17
	(0.27)	(0.26)	(0.18)	(0.64)
logGDP	0.83*	0.28	0.52	1.05*
	(0.33)	(0.19)	(0.40)	(0.45)
totalPopulation	-0.00	-0.00	0.00	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
GCI_InstB	0.66	0.40	1.20***	-0.12
	(0.38)	(0.75)	(0.23)	(0.25)
Constant	-144.08**	-80.97	-13.30	-4.09
	(52.49)	(43.71)	(59.28)	(15.67)
Observations	50	59	46	57
Adjusted R2				

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

W/A= West Africa, S/A= Southern Africa, N/A= Northern Africa, E/A = Eastern Africa, C/A=Central Africa