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Regional transport infrastructure integration and its contribution to Foreign Direct Investments (FDI) flow within Africa

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Summary

Economic competitiveness, trade and integration initiatives realised through favourable cross-border movement of people and their activities between regions and countries; are greatly rooted in an integrated transport infrastructure system. Previous researches have recognised that investments in transport infrastructure among countries advances the productivity and foreign investment potential of a region; as functional transport infrastructure enhances connectivity, and promotes ease of movement while lowering trade costs. In addition, several authors propound that economically competitive regions attribute their success to regional connectivity since it boosts transfer of FDI. This study therefore attempts to explain how regional transport infrastructure integration influences the flow of FDI within regional geographical blocs in Africa. The research quests to highlight how the four modes of transport infrastructure (road, rail, air and water) compare and contribute to the competitiveness of East, West, North and Southern geographical blocs; and to identify the shortcomings within the continent regarding cross-border infrastructure integration that slow economic development.

To tackle the request, four different panel regression analyses for the period between 2006 and 2016 were carried out to analyse the effect of each transport mode on FDI over the 11-year time interval. Apart from the twelve pillars of competitiveness, review of literature identified the implementation of liberalised transport policies; socio-political stability; transport infrastructure investments and availability and extent of transport infrastructure as some of the enabling factors that influence the development of transport infrastructure. The aforementioned factors form the conceptual framework of this research.

From the study, it emerged that economic competitiveness of regional blocs in Africa is indeed founded on well-integrated transport infrastructure that connects a bloc's member countries; as those that ranked highly on the different modes of transport over the years, recorded improvements in their inward FDI. This however was not the case for North Africa, as the trend of FDI development for the region dropped from the years 2007 to 2016 with minimal improvements; but still managed to be the best performing region in terms of transport infrastructure development throughout the years. This is because North Africa as identified from the literatures of the African Development Bank (AfDB, 2010, AfDB, 2016) ranked first among the regional blocs in Africa in transport development; as almost all the countries in the bloc have made tremendous initiatives to upgrade their transport infrastructure network. Also, as observed from this research, the region is seen to demonstrate average to great performances in just about all four transport modes under study. It follows that some of the shortcomings regarding transport infrastructure integration in Africa that were identified from this study include low density and connectivity of roads; insufficient regional railway network; inequality in air transport growth and weak cooperation between air carriers; and underdeveloped inland water and sea port transportation.

This research therefore argues that besides focussing on the best performing transport mode in a region, there should be a balanced development of all four modes of transport considered in this study in order to bring harmony and complementarity of cross-border infrastructure development that enhances transfer of FDI and economic competitiveness of the blocs.

Keywords

Foreign Direct Investments, transport infrastructure development, economic competitiveness, regional integration, African geographical blocs

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It is my hope that this work will inspire future scholars to continue with further exploratory research prospects that were not covered in this study.

I am entirely indebted to my family and loved ones for their support, patience and cheer throughout this rigorous one-year study program.

Dedication

First and foremost, I would like to dedicate this thesis to God, for indeed it has been by His grace which has always been sufficient that I reached this juncture in my life. I would also like to dedicate this work to my parents Mr. James K. Ndung'u and Mrs. Rose W. Kieha.

Foreword

As part of the one-year MSc. in Urban Management and Development programme at the Institute for Housing and Urban Development Studies, Erasmus University Rotterdam, The Netherlands; this work was prepared and presented prior to the completion of my studies. During the specialisation period in Urban Competitiveness and Resilience of the Masters' program, the urge to understand the relationship between the economic competitiveness of African countries as influenced by transport infrastructure integration grew on me. Thus, understanding the dynamics of transport network integration within Africa, which is a research domain with few authors, also propelled me to venture into that unique niche, considering the regional blocs within Africa. Equally, the curiosity to find out and explain what African countries can learn from the prosperity and progress of the European continent and its vast and interconnected transport system as observed from my short travel experiences, also formed the basis of this research.

The topic of study – Regional transport infrastructure integration and its contribution to Foreign Direct Investments (FDI) flow within Africa is in line with the Masters' program and the priorities of the Netherlands Fellowship Program (NFP) to support Sub Saharan Africa and other NFP countries. The Dutch organisation for internalisation in education (Nuffic) provided financial support that helped complete this research.

Abbreviations

Acronym	Definition
AfDB	African Development Bank
AIDI	Africa Infrastructure Development Index
CBI	Cross-Border Infrastructure
FDI	Foreign Direct Investments
GCR	Global Competitiveness Report
GDP	Gross Domestic Product
IHS	Institute for Housing and Urban Development
LPI	Logistics Performance Index
LSBCI	Liner Shipping Bilateral Connectivity Index
MNCs	Multinational Corporations
MNEs	Multinational Enterprises
REC	Regional Economic Competitiveness
SSA	Sub-Saharan Africa
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa
WDI	World Development Indicators
WEF	World Economic Forum
TAH	Trans-African Highways
TEU	Twenty-foot Equivalent Units

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Chapter 1: Introduction

This section elaborates on the foundation of this research by providing an outline of the background and problem statement, the objective and research questions. The chapter also elaborates on the significance and relevance of this study in addition to the scope and limitations of this research.

1.1 Background

Economic competitiveness of continents, countries, and cities is determined by trading activities and foreign investments flow between firms, businesses and enterprises (Schwab, 2016). The Global Competitiveness Report indicates that one of the key factors contributing to this competitiveness is the cross-border movement of people which according to Keeling (1995) is facilitated by a well-developed transport system. Investing in transport infrastructure connectivity elicits the movement of capital from foreign countries measured in terms of foreign direct investments (FDI) (Mbekeani, 2010). Transport infrastructure network rejuvenation promotes local industrial activity and diversification of regional production systems (Mbekeani, 2010); as it enables firms to identify potential investment locations, suitable production sites and prospective office locations which boost a country's or region's economic competitiveness (Schwab, 2016). Again, to enhance the competitiveness of economies and subsequently boost regional integration, Rietveld and Bruinsma (2012) together with Abuka (2005) mention that trade barriers can be reduced at the regional or international level with improved transport infrastructure integration. Regional transport integration therefore, may involve concerted efforts towards networking countries and cities transport systems (road, rail, air and water transport) into a coordinated interconnected cross-border system that facilitates access to markets and exchange of knowledge and technology (Bhattacharyay, 2009, Mbekeani, 2010, Potter and Skinner, 2000, Bhattacharyay, 2010).

Fujimura (2004, p. 3) asserts that regional integration "cannot proceed without regional transport and infrastructure". Nonetheless, the author further highlights that other conditions such as reconciled trade policies and concerted regional standards and guidelines, as well as enriched customs processes also promote this integration drive (Fujimura, 2004). In a study carried out by Lafourcade and Paluzie (2011) to investigate the effect of European integration on border regions of France, the authors found that international trade between regions with well-connected transport infrastructure and neighbouring countries is 129 per cent more improved than trade between border countries and internal regions with less integrated transport infrastructure (Lafourcade and Paluzie, 2011). Also, as at the year 1998 the Association of Southeast Asian Nations (ASEAN) had made a common arrangement to develop transport networks connecting member countries in a bid to promote regional interconnectivity, economic growth and efficient multimodal transport services. The components of this agreement included policy initiatives to liberalise maritime and air transport and the implementation of two major projects: the ASEAN Highway Network and the Singapore-Kunming Rail Link Projects (Bhattacharyay, 2009).

In the same way, efforts to improve regional socio-economic growth to attract FDI in Latin America targeted improvements in the transport sector through projects such as the Initiative for the Integration of Regional Infrastructure of South America (IIRSA), which began in the year 2000 (Sánchez Calderón, 2008 in Keeling, 2013). The role of transport infrastructure integration in attracting foreign direct investments into a region can therefore not be overstated.

It advances the competitiveness of countries, upholds trade and investments across borders while nurturing the national output of countries, hence promoting regional integration (Abuka, 2005, Akpan, 2014).

Contrastingly, inadequate regional transport infrastructure diminishes the movement of firms' activities and their overall productivity as a result of increased transport costs and ultimate high cost of trading (Akpan, 2014, Abuka, 2005). This situation is observed in Africa, where a study by Mbekeani (2010) highlights the severe impact of inadequate infrastructure on the continent's regional trade and integration. For instance, the author asserts that Africa lacks a regional railway network which (Phasiwe, 2007 in Naude, 2009) associates to the differences in rail gauges in the continent which make rail connections problematic. Also, Freire, Lall, et al. (2014) indicate that the transport infrastructure fragmentation observed in Africa may be partly attributed to the low density and connectivity of roads; which escalate interregional transport costs and consequently makes countries less competitive owing to their inability to access regional and global markets (Abuka, 2005, Freire, Lall, et al., 2014). Likewise, air transport in Africa according to Adeyeye, A (2016) is mainly constrained by inequality in the growth of air transport across the region; economic and political variances among African countries and weak cooperation between continental and intercontinental air service carriers. Another constraint to air transport in Africa indicated by Adeyeye, A (2016), is the poor execution of policies liberalising air services within the continent such as the 1999 Yamoussoukro Decision (YD); which aims at integrating air transport services and promoting competitive collaboration among African and non-African air carriers (Foster and Briceño-Garmendia, 2010). With regards to water transport in Africa, the United Nations Economic Commission for Africa, African Union, et al. (2010) indicates that maritime transport within the regional geographical blocs in the continent has since the year 1995 been on an upward development trend with the West and Central African ports leading this growth. On the contrary, inland water transport within the continent lags behind despite the presence of navigable water bodies in more than half the number of African countries which have the potential to provide inexpensive regional water transport (United Nations Economic Commission for Africa, African Union, et al., 2010).

Generally, Dupasquier and Osakwe (2006) add that poor transport infrastructure disfavours FDI flows by deterring investment initiatives within regional geographical blocs in Africa. The author furthers that part of the development initiatives that will endorse FDI flow within Africa include actions at the international, regional and country level such as coordinating infrastructure development; enhancing political stability; and gradually changing the adverse perception of the continent (Dupasquier and Osakwe, 2006). From the foregoing, the flow of foreign investments in Africa's regional geographical blocs can be said to be dependent on its efforts towards regional transport infrastructure integration.

1.2 Problem Statement

On matters relating to Africa's economic competitiveness, inadequate integration of the continent into the global economy coupled with regressive trade barriers and poor regional transport infrastructure connectivity within the continent contribute to the low regional count and value of foreign capital investments (Dupasquier and Osakwe, 2006, Abuka, 2005). A direct correlation exists between trade receptivity and flows of foreign capital into Africa (Bhattachrya, Montiel and Sharma (1997) and Morrisset (2000) in Dupasquier and Osakwe, 2006). Until recently, infrastructure investment in Africa had not been integrated at the international and continental level but was rather uncoordinated, disjointed and largely organised at the national level (Naude, 2009). Yet, Turok (2004) emphasises that regions should be viewed as wider systems within a network and must not be conceptualised as autonomous units; in that city-regions competitiveness in attracting FDI is not only dependent on favourable international trade policies but also on the extent to which transportation links connect to available external markets (Turok, 2004).

Presently, the African Union (AU), the African Development Bank (AfDB) and the United Nations Economic Commission for Africa (UNECA) have collaborated with other regional communities to construct a Trans-African Highway network connecting African cities and countries to each other. There are nine highways at present in the network covering about 57,300 Kilometres, which have to some extent contributed to the growing regional connectivity within the African continent. This translates to about 34 per cent rate of road access compared to 50 percent rate for other continental regions (United Nations Economic Commission for Africa, African Union, et al., 2010). For rail infrastructure, there exists approximately 89,000 kilometres of rail networks in Africa over an area of 29.6 million square kilometres that account for 2.5 kilometres per 1,000 square kilometres as compared to 40 kilometres per 1,000 square kilometres density for the European region. Furthermore, Africa's air transport in the year 2004 was pegged at 52 per cent and 3.6 per cent share of global passenger and freight traffic respectively (United Nations Economic Commission for Africa, African Union, et al., 2010). By the year 2007 however, there was an upward trend in air traffic figures for domestic, international and intercontinental passenger and freight travels in Africa (Bofinger, 2008 in United Nations Economic Commission for Africa, African Union, et al., 2010). Moreover, the continents maritime transport as discussed by the United Nations Economic Commission for Africa, African Union, et al. (2010) is supported by 80 sea ports through which approximately 95 per cent of the continent's intercontinental trade into regional geographical blocs is derived. On the other hand, inland water transport is largely constrained by social, environmental and political perturbations. Despite Africa's endowment in 5 major navigable rivers and 3 lakes that have the potential to connect regional geographical blocs within the continent, inland water transport is according to United Nations Economic Commission for Africa, African Union, et al. (2010) the weakest mode in the transportation network.

These figures suggest that there is a potential to grow in terms of regional transport infrastructure development and integration to attract foreign direct investments on a regional and intercontinental scale in Africa. What remains to be done is the harmonisation and integration of the aforementioned transport modes to derive wealth in form of FDI for the regional geographical blocs and the African continent as a whole. Knowing the impact of the existing regional transport system in Africa on FDI attraction will be a major step to identify the continents' present position in the global economy; detect transport connectivity gaps, and strategize and formulate policies to stimulate the upward economic trend of the continent. Even though there exists literature on various separate transport modes and their impact on foreign capital attraction in some regional geographical blocs within Africa, little is known on the

collective effect of an integrated transport infrastructure network system on FDI flow within the continent.

In this regard, the objective of this study is to explain the possible impact of an integrated regional transport infrastructure system on FDI flow within regional geographical blocs in Africa. This is achieved by testing the impact of improved infrastructure integration; explicating the effect of existing infrastructural connectivity of road, rail, water and air transport; testing the hypothesis that improved integration of transport infrastructure will boost FDI flow in Africa; identifying gaps in regional transport infrastructure integration, and contributing policy recommendations in favour of regional transport integration in an effort to increase the flow and magnitude of FDI within the continent.

1.3 Research Objective

The study aims to explain the possible effect of an integrated regional transport infrastructure system on FDI flow within Africa

1.4 Provisional Research Questions

1.4.1. Main Research question

This study is guided by the following questions:

- How does regional transport infrastructure integration contribute to the Foreign Direct Investments (FDI) for economic competitiveness of regional geographical blocs in Africa?

1.4.2. Sub-questions

- How does transport infrastructure integration compare between Africa's regional geographical blocs; East, West, North and Southern Africa?
- How is FDI flow affected by the existing gaps in regional transport infrastructure integration within the continent?
- In what ways does regional transport infrastructure integration contribute to FDI in East, West, North and Southern Africa?

1.4.3 Hypothesis

H_1 Improved integration of transport infrastructure will boost FDI flow in Africa

1.5 Significance of the study

There exists quite a number of studies on the relationship between FDI and infrastructure which combine both hard and soft infrastructure particularly for the African continent. However, studies that focus on the impact of transport infrastructure on foreign investments for the continent are not well explored; hence the development of this work. The study aims to contribute to scientific research by identifying gaps in regional transport infrastructure integration for Africa to advance on, and to add to the existing literature on the causality between transport infrastructure and economic competitiveness using foreign direct investments as a measure. In the same way, this study efforts to expatiate on why the African continent lags behind compared to other regions across the globe on matters cross-border integration; through the analysis of transport infrastructure development over the 11-year period under study.

Accordingly, the study attempts to elaborate on the interrelationship by observing the pattern of FDI flow within and between the regional geographical blocs applied in the present study for the period between 2006 and 2016 and also through statistical analyses that helped in further exploration of the phenomenon. In doing so, this work expounds on how regional competitiveness has developed over time and the possible changes necessary to progress the upward development trend of the African economy. Furthermore, the societal significance of this is to contribute policy recommendations in favour of regional transport integration to increase the flow of FDI; and promote connectivity of the geographical blocs in Africa.

1.6 Scope and limitations

The relationship between transport infrastructure integration and its contribution to foreign direct investments flow and attraction to any country, region, or continent is a critical and relevant area of study with vast explanatory opportunities for many researchers. This area of study affects the ability of city-regions to trade, share knowledge, skills and technology which impacts largely on regional economic competitiveness. However, the scope of this study is delimited to regional geographical blocs in Africa: North, South, East and Western Africa and attempts to present an exhaustive analysis of the correlation and causality between regional transport infrastructure integration systems and economic competitiveness of the continents geographical blocs using cross-sectional time series FDI data for the period between 2006 and 2016. Even though a research on the relationship and influence of transport infrastructure integration on foreign direct investments from other global economies into Africa would have made this study more global; the availability of data, time and financial constraints present challenges to the researcher but yet again present exploratory opportunities to keen researchers in the near future. Unavailability of data led to the omission of about 15 countries in the statistical analyses which led to the low number of observations and countries recorded.

Chapter 2: Literature Review / Theory

2.1 Introduction

The following literature review provides an in-depth analysis of existing literature with a thorough explanation of the theories and concepts in line with regional transport infrastructure integration and its causality on regional economic competitiveness. The chapter begins with an overview of regional economic competitiveness, foreign direct investments and transport infrastructure integration as the main concepts of this study. It furthers by establishing the link between transport infrastructure integration, elaborating on foreign direct investments as a credible measure for regional economic competitiveness, review of theories and empirical literature on the subjects and concludes with the conceptual framework for this research.

2.2 Concepts of the Study

2.2.1 Regional Economic Competitiveness

In recent years, studies in economic competitiveness in the global economy have evolved from national to regional economic competitiveness level as regions are wider spatial dimensions where investment flow and attraction can be analysed from as a result of organised economic development (Cooke, 1997, Amin, 1999, Huggins, Izushi, et al., 2013, Scott, 1995, Malecki, 2007, Werker and Athreye, 2004, Abuka, 2005). The level of productivity at the national level constitutes a set of policies, institutions and favourable economic factors that propel a country's level of growth which Schwab (2016) refers to as competitiveness. This set of policies, institutions and economic factors vary between regions and countries particularly for the reason that they impact heavily on the indicators of competitiveness and economic growth (Schwab, 2016). Likewise, Smit (2013) in Kiel, Smith, et al (2014) defines competitiveness as the degree to which business firms and enterprises in a region can vie for the same opportunities with other firms in a different location. Thus, competitiveness may be analysed at a spatial level also denoted as spatial competitiveness which covers an analysis of productivity at either the city, national or regional geographical scale; whilst firm level competitiveness looks at firms' productivity at different industrial or sectoral levels (Kiel, Smith, et al., 2014).

The Global Competitiveness Report avers that economic competitiveness of continents, countries and cities is attributed to trading activities and foreign investments flow between firms, businesses and enterprises (Schwab, 2016). Turok (2004) identifies three determinants of city-region competitiveness: ability of firms to trade in regional markets; use of natural resources and human capital; and productivity of goods exchanged in regional markets. The author furthers that competitiveness is a complex interaction between indicators and drivers of economic growth rather than a desired end goal consisting of an interplay between the aforementioned determinants. Innovative capacity of regions, local investment in infrastructure and the state of the labour market are a few other determinants that Malecki (2004, 2007) identifies from the regional environment that contribute to a region's competitiveness. Furthermore, Huggins, Izushi, et al (2013) accord the works of Porter, Clark, et al (2000) which assert that the indicators of wealth and economic growth that stem from profits and full employment of inhabitants as opposed to indicators qualified in monetary terms; make the foundation of the concept of regional economic competitiveness. Therefore, from the works of (Begg, 1999, Huggins, 2003, Storper, 1997, Audretsch and Keilbach, 2004, Huggins, Izushi, et al., 2013) regional economic competitiveness may be inferred to as preconditions which make it possible for business firms to locate and sustain their activities in any particular distinct

region; whilst attaining productivity, and advancing living standards of inhabitants and participants of the firm's activities with unchanging and growing market shares in their economic activities.

Theories on economic competitiveness stem from concepts of regional economic growth Huggins, Izushi, et al (2013). The authors propound that models on regional competitiveness are based on the foundation that carefully selected investments in growth and development indicators such as labour, knowledge, technology and infrastructure create the deviations in regional growth. Thus, a region's potential to attain economic growth comparable to other regional geographical blocs serving the same markets may be understood as regional economic competitiveness (Huggins, Izushi, et al., 2013). Competitive regions function as harmonised systems to enhance their overall productivity. The regions do so through self-organising into clusters that Porter and Ketels (2003) opine to consist of firms, service providers and institutions linked by reciprocities and commonness's such as natural resources, or highly dependent productivity relationships as those observed in Silicon Valley, California, United States of America or in the Southern Germany region among the high-performance car dealers.

For more than three decades, the World Economic Forum (WEF) has been evaluating and advancing the push factors of competitiveness organised into a Global Competitiveness Index (GCI) by Professor Schwab in 1979. The index is constantly evolving just as countries needs are ever changing (Schwab, 2016). The GCI describes the following twelve pillars of competitiveness as the indicators of an economy's degree of productivity that affect its current and future state of prosperity.

The first pillar- ***Institutions***: this indicator suggests that the institutional environment determines a country's competitiveness by setting rules that govern economic activities, developing legally binding laws that dictate how society interactions should be organised and creating incentives while lowering uncertainty to promote investments. This pillar shapes the decisions of Multinational Enterprises (MNEs) and Multinational Corporations (MNCs) as the institutional foundation governing trade and business activities in a country impacts greatly on production and trade activities of an economy.

The second pillar- ***Infrastructure***: this indicator is important as it facilitates exchange of knowledge, technology, skills and products by connecting countries through either hard or soft infrastructure (i.e. transport and telecommunications infrastructure). The quality of infrastructure available in a country determines the location of MNEs and MNCs and for this reason, the higher a country scores on this indicator the more investments it is able to acquire. Besides roads, rail, ports, air and telecommunications, infrastructure also includes healthcare, sanitation education and legal services present in an area which create a conducive environment that endorses productivity. Well-developed infrastructure promotes regional integration, reduced travel times and trade cost, creates order in the economic space, enhances worker throughput and accessibility to services.

The third pillar-***Macroeconomic environment:*** this indicator refers to the stability of the business and the overall economic environment of a country. If a country or region is characterised by fluctuating inflation rates, financial crises leading to recessions and regional economic volatility, the likelihood of foreign firms and business enterprises investing in that area diminishes. Also, changing financial policies in a country or region veer off investors as instability in an economy lowers the potential of business productivity.

The fourth pillar- ***Health and primary education***: this indicator highlights the need for economies to provide basic health and education services for its inhabitants to ensure that they are effective and hence boosting the productivity of a country or region and the overall

wellbeing of the people. Inadequate access to health services leads to lower productivity of workers and also discourages investments as poor health services translates to an inadequate business environment. In addition, access to basic education skills makes a population knowledgeable and effective in building an economy. Lack of basic education in an economy makes investors questions the potential success of their investment in such countries or regions.

The fifth pillar - ***Higher education and training*****:** this pillar affirms that for economies which aspire to elevate their position at the national or regional level of competitiveness; investment in higher education and training is a prerequisite in propelling an economy from the simple production processes to the multifaceted hubs fit for the dynamic nature of growing economies. In an exceedingly globalising economy, highly trained and competent workers that can adapt to changing environments and meet the needs of varying production processes are required to maintain investment potential of an area and also keep up with evolving competition.

The sixth pillar - ***Goods market efficiency*****:** this pillar centres on efficient and effective markets for goods to be exchanged in an economy. It calls for a trading environment free of impediments and minimum government intervention on business activities. Buyer sophistication and customer orientation steer market efficiency as the most efficient firms producing goods desired by consumers thrive in a regional economy. Thus, competition between firms to remain the most efficient and effective in the market generates competitiveness.

The seventh pillar- ***Labour market effic*****iency:** this pillar qualifies labour market flexibility and efficiency as important factor for economic prosperity. It propounds that workers in any competitive economy should be able to shift between economic activities with minimal social disruptions to encourage positive changes in wages that guarantee effectiveness of laborers in their business activities.

The eighth pillar - ***Financial market development*****:** this indicator emphasises on the need for fair allocation of local and international resources to productive economic activities geared towards regional competitiveness. This should be facilitated by well founded, financial regulatory institutions that create order and promote security of investments creating an enabling environment that attracts investments.

The ninth pillar - ***Technological readiness:*** this pillar is used to measure the ability of an economy to change or adapt new technologies into their systems without or while containing interruptions to a level that does not affect the stability of the economy. When an economy is able to integrate new technologies that boost productivity, increase efficiency and ensure reliable information and communication services; the investment capacity and regional competitiveness is likely to improve tremendously.

The tenth pillar - ***Market size*****:** this pillar stresses on market size which affects the productivity of firms as larger markets allow business enterprises to maximise on economies of scale. On a regional scale, this indicator qualifies countries that have a single integrated market to be more competitive and attractive to investors as opposed to small markets at the country level that do not provide investment benefits to business firms or enterprises.

The eleventh pillar- ***Business sophistication:*** this pillar highlights on the quality of firm's strategies and operations and the overall quality of business networks in a country. Particularly for developed economies, self-organisation into integrated regional clusters foster efficiency, promote productivity and innovation whilst eliminating trade barriers that hamper investments.

The twelfth pillar- ***Innovation***: the last pillar of competitiveness centres on technological advancement of economies achieved through investments in quality research institutions; geared towards knowledge generation, developing research and technological partnerships

between industries and higher learning institutions whilst protecting intellectual property. Such economies that invest in innovation developments are attractive to investors as these regions show potential for growth and improvement.

When carrying out an analysis of competitiveness, the above-mentioned twelve pillars adopted from Schwab (2016) are associated together as they underpin each other in all facets. It is of importance to note that shortcomings in one pillar of the economy in most cases have undesirable impacts on the other pillars.

2.2.2 Foreign Direct Investment (FDI) as a Measure of Regional Economic Competitiveness

Foreign direct investment is a term widely acknowledged as a collective accumulation of skills, technology and capital that is assimilated into a country or region different from its origin (Mullen and Williams, 2005). Wang and Wong (2009) equally accord that cross-border exchange of FDI encompasses exchange of assets, capital and technology between countries. Correspondingly, transfer of knowledge, technology and capital across borders through investments made by multinational enterprises (MNEs) and business firms is widely acknowledged across the globe as foreign direct investments (Balasubramanyam, Salisu, et al., 1996) in (Bode and Nunnenkamp, 2011). By nature of the investments made by multinational corporations (MNCs) and MNEs, either tangible or intangible, FDI are widely categorised into two types: Greenfield FDI, and Merger and Acquisition (M&A) FDI (Wang and Wong, 2009). The former refers to deliberate investments that include building of new facilities and creation of employment opportunities that collectively lead to a rise in capital stock and growth of incomes; whereas M&As are denoted as cross-border investments that attain interactions with present available firms in the new foreign country (Mullen and Williams, 2005, Wang and Wong, 2009).

City-region competitiveness in globalising economies is highly attributed to the amount of FDI that flows in and out of countries or regions (Schwab, 2016). As discussed above, regional economic competitiveness emanates from wealth indictors and economic growth from profits and rising incomes of a regions inhabitants obtained from MNCs and MNEs that invest and sustain economic activities in foreign locations (Huggins, Izushi, et al., 2013). Consequently, investments from MNEs and MNCs which are largely acknowledged as FDI accelerates competition between local firms, productivity and innovation of new technologies Blomstrom, Kokko, et al (2000) in Mullen and Williams (2005) and improve customer satisfaction and product varieties that match up to foreign standards (Porter and Ketels, 2003). From the forgoing, economic growth brought about by FDI activities of MNCs and MNEs lead to regional economic competitiveness.

In a different vein, Narula (2012) mentions that there are other factors that determine the differences in the level of FDI between regions. The author indicates that they include infrastructure, communication services, political stability, per capita GDP, tax incentives, growth rate, socio-political stability, size of local markets, favourable investor regulations and working regulations, competent labour, quality and transparency of host country institutions and productivity. These factors are also echoed in the above-mentioned twelve pillars of competitiveness which suggest that variations in these factors may also be used to quantify competitiveness between regions. FDI therefore represents a good measure for regional economic competitiveness. In this way, Narula and Marin (2003) indicate that policy makers now place an importance on the contribution of foreign direct investments from MNCs and

MNEs in promoting regional economic development, hence a good measure of regional economic competitiveness.

2.2.3 Transport Infrastructure Integration

Discussions and literature on the analysis of regional economic competitiveness (Gardiner, Martin, et al., 2006, Lengyel, 2004, Kiel, Smith, et al., 2014, Smit, 2013, Abuka, 2005) highlight infrastructure as a prerequisite for regional competitiveness in models used to explain economic competitiveness at the same geographical scale. Infrastructure on its own is a broad term, covering social, physical and soft infrastructure including facilities, systems and structures that form the foundation of an economy. Further still, Martin and Rogers (1995)in Smit (2013) define infrastructure as facilities, institutions, goods and services which range from telecommunications, transport, health care and judicial services provided by the state for the public that bridge the gap between consumption and production patterns. Similarly, Bhattacharyay (2008) in Bhattacharyay (2010) characterises infrastructure into either soft or hard infrastructure where soft infrastructure is intangible in nature and includes governance, institutional, policy, regulatory frameworks and strategies that support hard infrastructure; which the author furthers that they consist of basic utilities, transport and telecommunication services and energy. Thus, infrastructure that links two or more nations and has substantial cross border impact may be defined as regional infrastructure also known as cross-border infrastructure (CBI) (Bhattacharyay, 2010).

This discussion however focuses on regional transport infrastructure; since transport coupled with digital technological infrastructure according to Schwab (2016), facilitates people interactions that promote development, innovation and creativity; which lead to growth and productivity and ultimately translates to city-region competitiveness. Also, Smit (2013) reviewing the works of Gardiner, Martin, et al (2006) and other scholars, posits that the impact of infrastructure on regional economic competitiveness combines all types of physical and social infrastructure in their analyses and hence, the full potential of transport infrastructure on regional economic competitiveness is not well explored.

As stated earlier, investment in local infrastructure, innovative capacity and human capital contribute largely to a regions economic competitiveness (Huggins, Izushi, et al., 2013, Malecki, 2004, Malecki, 2007, Abuka, 2005, Akpan, 2014). Kiel, Smith, et al (2014) accord that regional investment in transport infrastructure promotes integration, enhances regional accessibility and is a prerequisite in boosting a regions competitiveness. In the same vein, Bhattacharyay (2010) adds that regional infrastructure development is important in the journey towards regional integration and collaboration since state or country infrastructure such as ports, roads, railways and airports form the foundations of regional connectivity. Fujimura (2004) agrees and opines that regional transport and other infrastructures are the back bone of regional economic integration. Hence, the essence of regional transport infrastructure integration cannot be overstated as Schwab (2016) and Abuka (2005) highlight its importance in reducing transport and trade costs, minimising travel time, connecting local to external markets and enhancing exchange of knowledge, skills and information, all of which impact largely on productivity and economic growth. In the same vein, Bhattacharyay (2010) equally adds that regional integration by means of improving physical connectivity works in favour of regional economic integration by promoting investments, trade and flow of FDI whilst growing, developing and providing access to regional and global markets through cross border infrastructure.

To understand what transport infrastructure integration encompasses, an attempt to define the concept by Potter and Skinner (2000) indicates that transport integration is embedded in the notion of improving sustainability and integration through a series of changes. Besides reiterating that there exists no definition of integrated transportation, the author advances that integration originates from how components of any system work collectively in tandem to bring out the functionality of a system. Relating to transport, an integrated system incorporates its operation and borderline system functionality which is rooted on great amounts of commitment, effort, resources and disbursals (Potter and Skinner, 2000). Thus, the author opines that a series of activities in phases are merged in an incremental method to constitute the term transport integration. These phases are embedded in each other and incrementally move from functional and modal integration to transport and planning integration then to social integration and lastly to environmental, economic and transport policy integration (Potter and Skinner, 2000). Modal integration starts with developing policies that allow diverse modes of transport either road, rail, air and water transport to support and accompany each other to facilitate locomotion. Then, transport and planning integration includes a policy that recognises the implications that land uses have on transport patterns and as a result attempts to harmonise and manage the impact of land use and transport while lowering travel needs. Following up closely at this stage is the social integration policy which tries to bring together users and transport providers, establishments such as learning institutions, work places and trade centres that instigate the need to move from one point to another and groups that experience the negative side effects (i.e. transport vibrations and noises). Lastly, the environmental, economic and transport policy integration gives rise to the concept of sustainability which as earlier stated forms part of the concept of transport integration. This last policy integration is geared towards taking the full advantage of the gains from the locomotive system whilst allowing for development of more transport options that are sustainable (Potter and Skinner, 2000). Once all these activities are put to work together in a city, region or continental level whilst achieving the maximum potential that each aspect can generates, a transport system may be said to be integrated.

Regional transport infrastructure integration, therefore, involves concerted efforts towards networking countries and cities transport systems (road, rail, air and water transport) into a coordinated interconnected cross-border system that facilitates access to markets and exchange of knowledge and technology (Bhattacharyay, 2009, Mbekeani, 2010, Potter and Skinner, 2000, Bhattacharyay, 2010).

2.2.4 Transport infrastructure integration and regional economic competitiveness

As discussed earlier, transport infrastructure is a constituent of one of the twelve pillars of competitiveness- Infrastructure, which to a larger extent impacts on regional economic competitiveness. For a long time, large-scale transport infrastructure investments also referred to as cross-border infrastructure (CBI) investments have been assessed and projected to impact on the growth of an economy either directly or indirectly (Kiel and Smith, 2013). Not only are transport infrastructure investments regarded as prerequisites to advancing accessibility as the link between people, knowledge, good and services, skills, and technology exchange between regional economies, but also they impact positively on a region's overall economic competitiveness (Bhattacharyay, 2010, Kiel and Smith, 2013, Akpan, 2014, Abuka, 2005). This infrastructure does so by connecting regional production services to supply chain networks thus enhancing trade flows and competitiveness and general productivity whilst allowing stagnating and slow performing economies to lessen economic development gaps (Bhattacharyay, 2010). Also, as posited by Akpan (2014) and Abuka (2005), cross border transport infrastructure

enhances regional integration, increases local production, boosts regional trade and investments and hence fosters countries' competitiveness.

Besides investments in transport infrastructure integration, Turok (2004) indicates that regional market organisation, effectiveness of cross border communications, international and country level policies within wider economic systems also influence regional economic competitiveness. Relating to foreign direct investments, Dupasquier and Osakwe (2006) opine that coordinated and collective planning at the regional, national, and continental level raises regional count of foreign direct investments through specific actions such as infrastructure development and market regulation which steer economic growth.

2.2.5 Enabling Factors of Regional Transport Infrastructure Integration

I. Implementation of liberalised transport policies

Implementation of liberalised transport policies encompasses deliberate and concerted initiatives designed to ease movement of people, goods and services through various transport modes; in an effort to improve integration and enhance economic activities among countries (United Nations Economic Commission for Africa, African Union, et al., 2010). To support these initiatives, cooperation and mutual agreements between governments usually translated into reconciled standards and regulations, common tariffs and improved border procedures; constitute trade policies that govern cross-border transport activities (Fujimura, 2004, Abuka, 2005). In Africa for instance, the United Nations Economic Commission for Africa, African Union, et al (2010) acknowledge the essence of transport policies in promoting regional integration; and indicated that the inability of African governments to actualise cross-border transport policies such as the 1999 Yamoussoukro Decision (YD) (Foster and Briceño-Garmendia, 2010) has hampered trade liberalization efforts and consequently slow regional transport infrastructure integration in the continent. Therefore, implementation of liberalised transport policies is a crucial precondition to realising integration of country's transport infrastructure to boost economic development and investments.

II. Socio-political stability

As discussed earlier, economic competitiveness of regions is anchored by the level of productivity at the national level which is grounded on conducive policies, favourable economic factors and institutions that propel a country's level of growth (Schwab, 2016) . This assertion is affirmed by Côté and Healy (2001) who indicate that the performance of national economies is to a larger extent hinged on Governance Infrastructure which make up the institutional, political and legal environment of a country (Globerman and Shapiro, 2002). Furthermore, the investment milieu of countries according to Globerman and Shapiro (2002) is set by the Governance Infrastructure which as a result spurs economic growth. Hence, the more favourable the Governance Infrastructure of a country or region there is, the more the productivity, growth and investments realised. From the foregoing, the emphasis on political stability in fostering economic growth and investments cannot be overstated.

In light of the above, a study on the determinants of FDI to developing countries particularly Sub-Saharan Africa by Asiedu (2006), indicates that political instability is one of the major impediments to FDI flow and attraction into the continent. Similarly, the work of Dupasquier and Osakwe (2006) identifies three main reasons to the reluctance of foreign investors to

engage in cross-border activities in Africa namely: political instability, macroeconomic instability and lack of transparent policies. The authors mention that the political instability of the African continent manifested in ethnic and religious conflicts, wars and recurrent military interventions; undermine regional integration and infrastructure development efforts and consequently deter investment initiatives (Sachs and Sievers, 1998, Dupasquier and Osakwe, 2006, Asiedu, 2002, Asiedu, 2006, Abuka, 2005).

III. Availability and extent of transport infrastructure

Measures to enhance regional connectivity and integration are facilitated by the availability and extent of transport infrastructure. From literature, regional integration as discussed by several authors is supported by the development of cross-border infrastructure, of which transportation constitutes the largest contributor by providing access to new markets, promoting trade and flow of foreign investments (Fujimura, 2004, Bhattacharyay, 2010, Asiedu, 2002, Abuka, 2005). For instance, a similar study that explored the relationship between transport infrastructure and FDI by Khadaroo and Seetanah (2007) concluded that available transport infrastructure represents the most influential characteristic of attractive investment locations within the Sub-Saharan Africa. Hence, the extent of transport infrastructure availability is significantly meaningful to the level of integration of countries and regions.

IV. Transport Infrastructure Investments

Countries investments towards infrastructure development are key to enhancing the overall productivity of an economy by simply facilitating connectivity and access among trading entities. Directing finances, expertise, and any efforts to advance and expand an economy's fixed assets positively contributes to economic growth. The work of Badalyan, Herzfeld, et al. (2014) that investigates on the relationship between transport infrastructure investments and economic growth, led to the conclusion that transport investments enhance reliability and efficiency of an economy's transport network; whilst increasing investment potential of the area by facilitating the exchange of capital and labour between countries. Their analysis in particular used the measure of Gross Capital Formation (GCF) computed from a country's GDP and their results revealed that economic growth correlates positively and significantly with GCF (Badalyan, Herzfeld, et al., 2014). Thus, transport infrastructure investments are requisite conditions when working towards economic growth and competitiveness of regions.

2.3 Empirical literature review

Upon thorough literature review, there are a few observations of regions that have implemented and integrated regional transport infrastructure gearing to regional economic competitiveness; hence the foundation of this study that regional transport infrastructure contributes largely to regional flow of FDI. In an article by Bhattacharyay (2010) titled "Infrastructure for ASEAN Connectivity and Integration", the author expounds on the role of infrastructure in the growth, development and economic integration of the region. The article furthers the discussion by elaborating on infrastructure in the ASEAN region, its importance in narrowing the gap of regional economic development, advancing trade and regional investments, reducing poverty within the region and also the challenges and setbacks in infrastructure development. In the study, Bhattacharyay (2010) found that regional infrastructure investments alleviate nationwide competitiveness, advance local production and regional productivity. The author propounds that this is achieved through integrated railway, road, air and water transport modes,

and improved telecommunications and energy links. In addition to promoting regional competitiveness, ASEAN infrastructure according to the study advances regional and intercontinental economy connectivity (Bhattacharyay, 2010, Bhattacharyay, 2009).

Similarly, research by Khadaroo and Seetanah (2009) on the role of infrastructure in influencing FDI attraction into thirty-three African economies for the period between 1984-2002 with a specific focus on transportation revealed that mainly for Sub-Saharan African (SSA) countries; infrastructure development including transportation are crucial components to FDI attraction into the region. The authors opine that foreign investors from multinational corporations (MNCs) and multinational enterprises (MNEs) consider transport infrastructure to a greater extent when searching for attractive countries to invest in; as compared to other infrastructure (Khadaroo and Seetanah, 2009). Above all, the study did not lack limitations as the authors highlight that data quality constrained the study and were consequently not able to assess the quality of physical measures and the extent of regional infrastructure connectivity. What is more, education, openness to trade in regions also emerged as important regional components that boost FDI (Khadaroo and Seetanah, 2009). This leads to the conclusion that policy makers need to direct more attention to regional transport infrastructure investments to enhance FDI flow within Africa.

Moreover, to a more recent and specific research on air transport integration, a study by Bannò and Redondi (2014) that purposed to find out the effect of the airline system around the globe on the attraction of FDI into Italy identified that regional exchange of FDI is likely to increase with the incorporation of a new airline route, lowering of business enterprises and firm's transport and trade costs, and facilitating share of knowledge, skills and technology. The results of the study indicated a 33.7 per cent increase in FDI count within the region in two years of operation of the new airline route. Bannò and Redondi (2014) therefore resolved that investments that expand the capacity of air transportation, efforts to enhance cooperation and connectivity between air service carriers and reducing transport bureaucracies back up regional policies intended to advance FDI flow whilst supporting the rejuvenation of international airports and overall development of regional transport infrastructure.

Furthermore, with an understanding of public infrastructure as physical connections of roads, airports, telecommunication services and facilities, water systems, waste treatment facilities and electricity, Kodongo and Ojah (2016) in their study that purposed to find out whether infrastructure leads to economic growth in Sub-Saharan Africa (SSA); lead to the conclusion that investments in infrastructure particularly those geared towards development and economic growth of SSA are vital to any economy. Having used the system Generalized Method of Moments (GMM) to test an economic growth model amplified by an infrastructure variable for a case study on 45 SSA countries for the period between the year 2000 and 2011, the author finds that accessibility and quality of infrastructure also affect trade competitiveness and FDI flows into SSA. Besides count, accessibility and quality of infrastructure, improvement in accessibility, infrastructure investments and promoting regional integration are the most influential factors that may lead to regional economic competitiveness of SSA countries (Kodongo and Ojah, 2016).

2.4 State of the Art of the Theories

2.4.1 The Eclectic Paradigm

To explain the indicators or factors that lead to the realisation of foreign direct investments (FDI) activities from foreign business activities, Dunning (2000) uses the Eclectic Paradigm also denoted as the OLI framework. In particular, this framework has been adopted by economic geographers and urban planners across the globe mainly to explain the conducive factors that are sought by multinational corporations (MNCs) or multinational enterprises (MNEs) in foreign countries; and equally influence a firm's geographic location, aspects of production and the resultant growth of the firm's activities (Dunning, 2000).

The OLI framework is composed of three sub-paradigms: (O)- Ownership, (L)- Location and (I)- Internalisation. According to the framework, a firm's decision on the location of an enterprise in a certain geographical location will be determined by the resources and assets that the firm can take possession of. The Ownership sub-paradigm indicates that if foreign firms are guaranteed of advantages over local firms in a prospective host country to allow for competition, the more probable it is that a firm's activities will move into that host country (Dunning, 2000). In the same way, Stoian and Filippaios (2008) in their study also indicate that firms require Ownership advantages also known as 'monopolistic' or 'competitive' advantages that can also recover the costs of setting up and operationalising a firm's activities in a foreign country. Equally, reviewing the work of Anastassopoulos (2007, p. 39) on countries' international competitiveness and FDI for certain member countries and regions, the author also accords the work of Dunning (2000) by highlighting that (O) advantages control on 'who is going to produce abroad' and re-count marketing and management skills, proficiency in the organisation of foreign activities and also the technology brought about by the new investment.

The (L)- Location sub-paradigm as described by Dunning (2000) elaborates on the attractive endowments of a prospective host country that would pull the investment activities of MNCs or MNEs into a country or region. This sub-paradigm asserts that the more natural, permanent or built endowments that a region has, the higher the probability that foreign firms will gravitate towards that country or region to exploit those advantages whilst expanding their cover of foreign activities (Dunning, 2000). These endowments according to Denisia (2010) are categorised into either economic, political or social advantages including infrastructure; that make it possible for MNCs or MNEs to have more returns compared to a local company. Again, Anastassopoulos (2007) echoes that diverse arrangements of the spatially delimited Location advantages specified by Dunning (2000) also impacts on a firm's competitiveness. Stoian and Filippaios (2008, p. 5) in their study correspondingly interpret Dunning's (2000) (L) factors as 'influence on where to produce' when foreign companies are looking for host countries to expand their investments.

The last sub-paradigm in the OLI framework- (I)- Internalisation as prescribed by Dunning (2000) gives substitute ways that firms may develop and exploit their core production activities which give foreign firms more advantages over their counterpart local firms in the prospective host country. Denisia (2010) asserts Dunning's (2000) view by citing that Internalisation advantages explains the reasons why firms would prefer to invest FDI in foreign countries as opposed to selling franchise rights to local companies; as the benefits accrued from FDI outweigh those obtained from franchise partnership agreements. Stoian and Filippaios (2008, p. 5) likewise concur with the Internalisation sub-paradigm and mention that it 'addresses the question of why firms engage in FDI rather than license foreign firms to use their proprietary assets'.

It is worth mentioning that besides the three determinants of the OLI framework, there are other factors which are considered to influence regional or country level FDI count which include economic and political status of the prospective investment locations; the nature of the firm's characteristics and activities; and the purpose or drive for firms in carrying out their activities which reflects on the productivity and competitiveness of a region (Dunning, 2000). In addition, the simplistic nature of the Eclectic paradigm limits its applicability to peculiar settings thus lowering its ability to explicate certain investment decisions and actions of foreign enterprises (Dunning, 1988, Dunning, 2000, Dunning, 2001, Stoian and Filippaios, 2008, Cantwell and Narula, 2001, Dunning, Pak, et al., 2007).

2.4.2 Economic Integration Theory

Drawing from the works of Viner (1950), Meade (1955) and Lipsey (1957) on the Economics of customs and the Theory of Customs Unions: Trade Diversion and Welfare; professor Bela Balassa (1928-1997) developed a theory that purposed to explain the effects and benefits of integration on economic activities and trade known as the Theory of Economic Integration (Balassa, 1961). The theory specifies the principles and processes involved in the drive towards integration, the impact on the economy as a result of integration processes, and the challenges likely to be encountered when bringing together economies. Balassa (1961) also improved on the International Trade Theory which did not include movement of factors of production and organisation of policies affecting economic activities; which are vital determinants of the effect of integration on trade and economic activities. Marinov (2014) accords the theory of Economic integration and further categorises the growth stages of the theory into two: Classic Theory and New Economic Integration Theories. The former explicates on the advantages of integration using conventional theories of economic integration whilst the latter comprises of an analysis of the changing economic structures using New Economic Integration Theories (Marinov, 2014).

Similarly, Grimwade, N. (2013) also acknowledges the work of Balassa (1961) in his study by indicating that the theory is part of economic studies that looks into the various forms of integration between member states of a region and the integration that occurs on a global perspective. For instance, the author highlights how the economic integration theory explains trade liberalisation activities that took place in Europe during the formation of the European Community and European Free Trade Area in the years of 1958 and 1960. The theory is behind the activities that promoted integration in Europe which included establishment of a common market, eradication of trade barriers and the use of common currency; all of which enhanced the drive toward economic integration thus endorsing regional economic competitiveness. Grimwade, N. (2013) also echoes that the Economic Integration Theory of Balassa (1961) which boosts the international trade theory by including other factors such as advantages of largescale production of goods for large single regional markets; and competitive production and mobility of production factors. These other factors according to the author highlight the importance of locations and their interconnectivity while analysing the impact of integration (Grimwade, N., 2013).

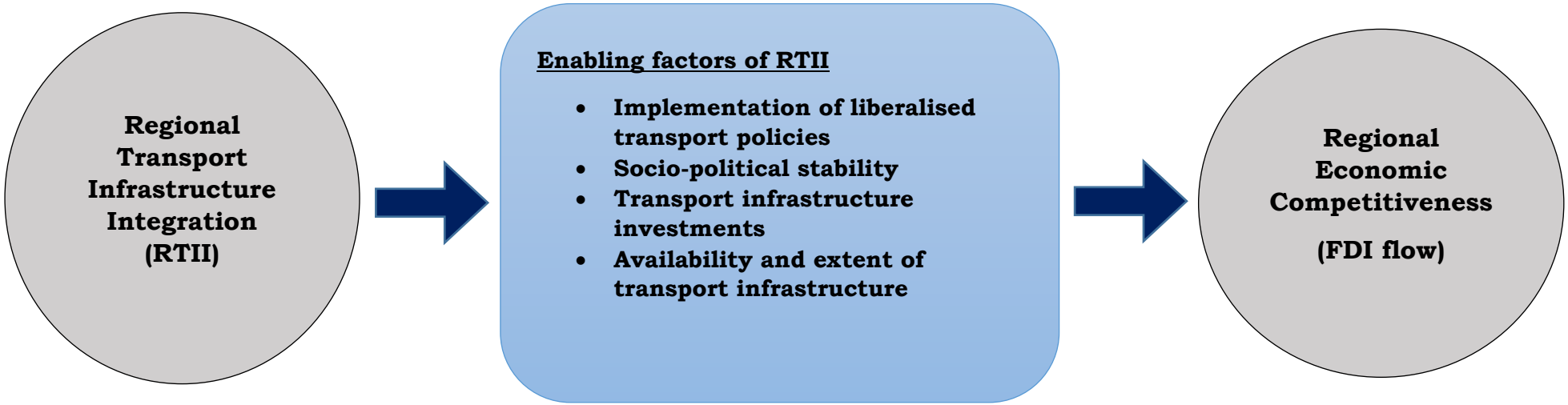
Furthermore, Balassa (1961) propounds that the Economic Integration Theory is not only delimited to locational analyses of integration effects; but also, government policies and their coordination effects on regional economic activities, as well as the surety and stability of economic interactions between regional economies (Balassa, 1961).

2.5 Conceptual Framework

Miles and Huberman (1994, p.18) in Maxwell (2012) defined a conceptual framework as a pictorial illustration that "explains either graphically or in narrative form, the main things to be studied- the key factors, concepts or variables and the presumed relationships among them". Also known as the theoretical framework (Maxwell, 2012), Thiel (2014) describes a theoretical framework as an abstract representation of an answer supported by theories to explain a study's research question which should be applicable and capable of being proven. For this reason, a conceptual framework may be understood as an explanation of a phenomenon, that scholars or academics effort to study relevant variables or indicators in order to establish a correlation (Maxwell, 2012, Thiel, 2014).

Review of literature on transport infrastructure integration and regional economic competitiveness measured using FDI reveals that; besides regional attempts to implement the twelve pillars of competitiveness which infrastructure is part of, there are other enabling factors that regions need to harness in order to pursue regional CBI infrastructure integration. The principle aim of transport integration is to connect regions to each other consequently opening up economies to a plethora of possibilities, and leading to the founding principles of regional economic competitiveness which are: sharing of skills, knowledge and technology. Based on review of literature in this study the factors identified include: implementation of liberalised transport policies; socio-political stability; transport infrastructure investments; and availability and extent of transport infrastructure discussed under section 2.2.5 above and hence form the enabling factors illustrated below. Together with the pillars of competitiveness, the aforementioned factors are the considerations revealed that need to be in place to progress the economic competitiveness of African regional blocs brought about by RTII.

Figure 1: Conceptual framework



Source: Author 2017

Chapter 3: Research Design and Methods

3.1 Introduction

This chapter outlines the methods, strategies and techniques employed in this study. It starts with the revised research questions, operationalization of variables and indicators which includes the definition of concepts used in the context of this study, a description of the research strategy, and the data collection and analysis techniques applied. This section also describes how the researcher maintained the validity and reliability of this study.

3.2 Revised Research Questions

3.2.1 Main Research question

- How does regional transport infrastructure integration contribute to the Foreign Direct Investments (FDI) for economic competitiveness of regional geographical blocs in Africa?

3.2.2. Sub-questions

- How does transport infrastructure integration compare between Africa's regional geographical blocs; East, West, North and Southern Africa?
- To what extent does regional transport infrastructure integration contribute to FDI in East, West, North and Southern Africa?
- How is FDI flow affected by the existing gaps in regional transport infrastructure integration within the continent?

3.3 Operationalization of Variables and Indicators

Thiel (2014) describes the operationalization process as the evolution of a study from theory to empirical studies where research concepts are explained and decoded into measurable constructs that illustrate phenomena in the real world. Also, borrowing from Straits and Singleton (2011) operationalization may also be understood as an elaborate explanation of measurable or observable units used in the analysis of the different variables and indicators that elucidate on a concept.

Table 1 below present the definitions of the various concepts used in the context of this study

Table 1: Definition of Concepts

S/No	Concept	Definitions	Context Definition	Source
1.	Regional Transport Infrastructure Integration	**Regional infrastructure-** infrastructure that links two or more nations and has substantial cross border impact. Regional infrastructure is also known as cross-border infrastructure (CBI) (Bhattacharyay, 2010) **Transport integration-** series of activities that are merged in an incremental method namely from: functional and modal integration to transport and planning integration to social integration and lastly to environmental, economic and transport policy integration (Potter and Skinner, 2000)	**Regional transport infrastructure integration** - refers to concerted efforts towards networking countries and cities transport systems (road, rail, air and water transport) into a coordinated interconnected cross-border system that facilitates access to markets and exchange of knowledge and technology	(Bhattacharyay, 2009, Mbekeani, 2010, Potter and Skinner, 2000, Bhattacharyay, 2010)
2.	Foreign Direct Investments (FDI)	**FDI-** acknowledged as a collective accumulation of skills, technology and capital that is assimilated into a country or region different from its origin (Mullen and Williams, 2005). Wang and Wong (2009) accord that cross-border exchange of FDI encompasses exchange of assets, capital and technology between countries. **FDI**- refers to transfer of knowledge, technology and capital across borders through investments made by multinational enterprises (MNEs) and business firms Balasubramanyam, Salisu, et al (1996) in (Bode and Nunnenkamp, 2011).	**FDI-** refers to cross-border exchange of assets, capital and technology between countries by multinational enterprises (MNEs) and multinational corporations (MNCs)	(Mullen and Williams, 2005, Wang and Wong, 2009, Bode and Nunnenkamp, 2011)
3.	Regional Economic Competitiveness	**Competitiveness-** The level of productivity at the national level which constitutes a set of policies, institutions and favourable economic factors that propel a country's level of growth (Schwab, 2016). Smit (2013) in Kiel, Smith, et al (2014) defines **competitiveness** as the degree to which business firms and enterprises in a region can vie for the same opportunities with other firms in a different location.	**Regional economic competitiveness** - preconditions which make it possible for business firms to locate and sustain their activities in any particular distinct region; whilst attaining productivity, and advancing the living standards of inhabitants and participants of the firm's activities with unchanging and growing market shares in their activities.	(Begg, 1999, Huggins, 2003, Storper, 1997, Audretsch and Keilbach, 2004, Huggins, Izushi, et al., 2013, Schwab, 2016, Naude, 2009, Kiel, Smith, et al., 2014)

Source: Author, 2017

3.3.1 The Independent Variable

In this research, the independent variable - regional transport infrastructure integration is operationalised as transport network measures that encompass characteristics of connectivity and integration; which make up the sub-variables of this concept. Connectivity and integration of the four modes of transport under study are analysed using the following indicators: liner shipping bilateral connectivity index and three maps that show the spatial distribution of the Trans African Highways (TAH), rail roads and airports infrastructure. The liner shipping bilateral connectivity index (LSBCI) is a compilation of indices that evaluate the direct or indirect shipping connectivity of any two countries over time (Hoffmann, J. and Fugazza, M., 2016). The highest values of the LSBCI are attained from shipping connections between regions where the top values have been dominated by shipping activity from Asia and Europe. Hoffmann, J. and Fugazza, M. (2016) indicate that the values in the index are mainly influenced by the dynamics of centrality of a country in the liner shipping network. Accordingly, the data was extracted for all African countries under study and an analysis of the shipping connectivity between the years of 2006 and 2016 carried out.

As indicated by Fujimura (2004), there are some enabling factors which promote the development of regional transport infrastructure integration. In this study, these enabling factors are operationalised as the availability and extent of transport infrastructure; socio-political stability; transport infrastructure investments and implementation of liberalized transport policies. The availability and extent of transport infrastructure covers the four different modes of transport namely: railroads, road transport, water transport and air transport. The study looks at all aspects of transport infrastructure availability and a figure of the passengers, goods and services transported by each mode; and attempts to quantify the extent to which transport infrastructure influences the exchange and interaction of activities.

For purposes of monitoring the development progress of transport infrastructure within the continent, the Transport Composite Index that is part of the Africa Infrastructure Development Index (AIDI); developed by the African Development Bank (AfDB) is used for the analysis on the availability and extent of transport infrastructure development, and its impact on economic competitiveness (AfDB, 2016). Kodongo and Ojah (2016) use the AIDI in their study to identify whether infrastructure development has an impact on economic growth in Sub-Saharan African (SSA) countries. The authors find that the index used as a proxy for infrastructure development in their analysis, showed high levels of significance against real GDP for SSA countries (Kodongo and Ojah, 2016). Again, to illustrate the degree to which countries and regions direct investments towards transport infrastructure development, the Gross Capital Formation (GCF) (percent of GDP) is selected as an indicator. The GCF (per cent of GDP) looks at the investment directed by governments towards the fixed assets of their economies such as in the construction of railways, roads, ports and air transport infrastructure; inventory changes and procurement of valuables for the economy obtained from the Worldwide Development Indicators (WDI) (World Bank, 2016). In a related study that investigated on the relationship between transport infrastructure and economic growth (Badalyan, Herzfeld, et al., 2014), the authors found that investment in transport infrastructure such as railroads represented using GCF in their analysis provided a significant outcome that presented its positive relationship with economic growth.

Dupasquier and Osakwe (2006) together with Asiedu (2006) propound that political instability is one of the major impediments to FDI flow and attraction into Africa. In this vein, this study considers socio-political stability as an enabling factor to the realisation of regional integration and consequent development of cross-border transport infrastructure. The study operationalises this concept as Governance and political influence measured by the indicators of Government Effectiveness: Estimate and the Political stability index; all of which were obtained from the

World Bank development indicators and the Global Economy database. The government effectiveness estimate depicts the opinions on the quality of civil and public services, policy formulation and implementation. Besides, the indicator measures the independence of public and civil service delivery from political influence as well as the government's integrity towards policy formulation and implementation (World Bank, 2016). Likewise, the political stability index is a compilation of different indices from several sources including the Political Risk Services and the Word Economic Forum (WEF); that represents various conflict issues, international tension, social unrest, unsystematic government transfer of power observed in different nations. In a related study, Globeman and Shapiro (2002) used the Government effectiveness estimate as one of the measures in examining the influence of governance infrastructure in FDI flow and attraction for both developed and developing countries.

Again, the theory of Economic Integration propagated by Balassa (1961) places importance on eradication of trade barriers, establishment of a common market within regions, movement of factors of production, organisation of policies affecting economic activities all of which are vital determinants to the effect of integration on trade and economic activities. This study also takes account of the author's notion on Economic Integration by representing the variable - Implementation of liberalized transport policies using the indicators of Customs border restrictions and Trade and customs policies. Custom border restrictions typified by Burden of customs procedures indicator is a measure of a country's border functionality based on opinions obtained from business managers and executives (World Bank, 2016). Equally, trade and customs policies are illustrated using the indicator - quality of trade and transport related infrastructure obtained from the Logistics Performance Index (LPI) of the World Bank; whose data was collected from respondents that ranked the quality of roads, ports, information technology and railroads on a scale of (1-very low to 5-very high). From review of literature, Abuka (2005) and Fujimura (2004) indicate that red tape custom processes, informal border checkpoints and incessant fraudulent activities characterise cross-border clearance procedures at border points in Africa. The authors further opine that these are some of the factors that have led to the rising transport costs and diminishing cross-border trading activities within the continent (Fujimura, 2004, Abuka, 2005). These indicators therefore symbolise the extent to which customs and trade procedures influence regional infrastructure integration initiatives.

Control variables are variables incorporated in a study and are held constant during the statistical analysis period to fix or set the influential potential of those identified factors to a minimum (Thiel, 2014). The logic is that when held constant the effect of the stimulus or intervention can be established clearly. Hence, for this study country size and openness to FDI and market size represented as land area per square kilometre, GDP per capita and Trade (per cent of GDP) respectively, make up the control variables of this research. These geographical indicators are used to ensure that market size, openness to FDI and size of a country or regional bloc, do not influence the degree to which transport infrastructure development takes place. Once applied during the statistical analysis, endogeneity is regulated and thus the study can establish the effect of the independent variable on the dependent variable.

Table 2 below shows the variables and indicators used to measure each of these factors.

Table 2: Operationalization of the Independent variable

SN	Concept	Variables	Sub-variable	Indicators	Scale	Source
1.	Regional Transport Infrastructure Integration	Transport network measures	Connectivity and Integration of transport infrastructure	- Liner shipping bilateral connectivity index (LSBCI)	Ratio	UNCTAD
				- Trans-African highways map	Map	UNECA, AU
				- Map of airports in Africa	Map	Developed by Author
				- Rail lines across regional borders (total route-km	Shapefiles	DIVA GIS
2.	Enabling factors of regional transport infrastructure integration	Availability and extent of transport infrastructure	Rail transport	- Railways, goods transported across regional borders (million ton-km)	Interval	World Bank
				- Rail length, total route kilometres	Sum	World Bank
				- Railways, passengers carried across regional borders (million passenger-km)	Ratio	World Bank
			Road transport	- Roads, total network across regional borders (km)	Shapefiles	DIVA GIS
				- Quality extensiveness and condition of roads	Interval	GCR
			Water transport	- Container port traffic (TEU: 20-foot equivalent units)	Sum	WDI
				- Quality of ports infrastructure (WEF) (1=extremely underdeveloped to 7=well developed and efficient by international standards)	Interval	World Bank (LPI)
			Air transport	- Air transport, registered carrier departures worldwide	Interval	World Bank
				- Air transport, passengers carried	Ratio	World Bank
				- Air transport, freight (million ton-km)	Ratio	World Bank
			Transport infrastructure development	- Transport Composite Index	Ratio	AfDB
			Transport infrastructure investments	- Gross Capital Formation (GCF) (% of GDP)	Ratio	World Bank
		Socio-political stability	Governance and political influence measures	- Government Effectiveness: Estimate	Ratio	World Bank (WGI)
				- Political stability index	Ratio	The global economy
		Implementation of liberalized transport policies	Customs border restrictions	- Burden of customs procedures WEF (1-inefficient-7-Efficient)	Interval	World Bank (WDI)
			Trade and customs policies	- Quality of trade and transport - related infrastructure (1=low to 5=high)	Interval	World Bank (LPI)
3.		Control	Country size	- Land area per square kilometre	Ratio	WDI
			Market size	- GDP per capita	Ratio	WDI
			Openness to FDI	- Trade (per cent of GDP)	Ratio	WDI

Source: Author, 2017, Based on several databases (2006 to 2016) as indicated in the source column above

3.3.2 The dependent variable

Regional economic competitiveness, the dependent variable, has been operationalised in this study as a variable of foreign direct investments (FDI) measured as FDI network value of investments in current United States Dollar (USD$). The values computed for this analysis include the total FDI into an African country from the rest of the continent for the period between 2006 and 2016. As discussed in the previous chapter, FDI makes a good measure of regional economic competitiveness as changes in the factors that determine the variations of FDI between regions (Narula, 2012) may be used to quantify competitiveness between regions due to their similarity to the twelve pillars of competitiveness (Schwab, 2016). This study therefore adopts the same measure to compute the changes and magnitude of effect of FDI for economic competitiveness of regional geographical blocs in Africa as an outcome of changes in the level of transport infrastructure integration. Table 3 below shows the variable and indicator used.

Table 3: Operationalization of the Dependent variable

S/No	Concept	Variable	Indicator	Scale	Source
1.	Regional Economic Competitiveness	FDI	FDI network value (Million USD$)	Ratio	FDI Markets

Source: Author, 2017 Based on FDI Markets data

3.4 Research strategy

3.4.1 Research Techniques

The study primarily applies the desk research strategy with a focus on secondary data analysis using statistical and quantitative methods and techniques. Theil (2014) describes the desk research strategy as a cost effective and efficient strategy that utilises information and data either in its primary or secondary form. The author opines that data obtained from existing materials such as minutes, newsletters, bibliographies and policy documents which have not been developed for use in research purposes are known as primary data; while statistical information, findings and conclusions contained in existing databases such as those of independent researchers or international organisations and can be used in similar or associated studies, constitute secondary data in the desk research strategy (Thiel, 2014).

In the same way, secondary analysis involves a combination several existing datasets developed by other researchers and organizations to formulate a dataset that can be used for interpretation and analysis purposes (Thiel, 2014). Besides being a cost-effective strategy, existing data used in the desk research strategy provide numerous advantages to researchers primarily the availability of many data sources allows researchers to compare results against previous studies; as replicability enhances the validity and reliability of a research. Also, research on phenomena that can only be approached indirectly and not through people's perceptions or behaviour (using first hand primary data) may only be carried out using secondary data (Thiel, 2014). What is more, Babbie (1990) and Theil (2014) reiterate that comparative research on a global, regional or international scale can be done using secondary data independently and from the comfort of the researcher's location as no travelling is needed. On the contrary, the main disadvantage of using existing data is the attribution problem encountered during operationalization of the concepts of study. A research analysis may

consistently and accurately measure a concept incorrectly due errors made during operationalization (Straits and Singleton, 2011, Thiel, 2014). Furthermore, collecting and analysing existing data can be tasking, labour intensive and time consuming as it requires time and effort to go through many databases, print and digital material prior to settling on the data to be used. Despite the numerous advantages that the desk research strategy using secondary data has, the researcher must always consider applying a mixed method approach also known as Triangulation in order promote the reliability and cogency of the research (Thiel, 2014).

Therefore, to explain the causality between regional transport infrastructure integration on the economic competitiveness of geographical blocs in Africa, a trend analysis of the blocs' economic performance with particular attention to FDI flow between countries provided insight as to how competitive the regions are, and to what extent transport infrastructure integration and regional connectivity influences their competitiveness. The desk research strategy allowed for generalization of results and coverage of a large geographical scope in addition to being a time and cost-effective research method (Thiel, 2014); all of which were critical considerations made prior to applying this research strategy. In addition, since this study is an inductive research which builds on pre-existing knowledge and findings from other renowned authors in the subject of study with observed development patterns and outlooks obtained from coherent reasoning and previous research; the desk research approach was chosen to explain the relationship between the concepts of study (Thiel, 2014). Apart from secondary analysis of existing data from reliable datasets, digital and hardcopy material; primary quantitative computations made from generation of maps using the ArcMap software, and statistical calculations using STATA are also applied in this study.

3.5 Data Collection Methods

The research analyses regional geographical blocs in Africa; North, West, East and Southern Africa (see annex 1) in which all the fifty-four (54) African countries were included in the analysis. Since complete panel data for South Sudan was not available for the entire period of study (2006-2016), the available data was aggregated with that of Sudan to consider it as one country with Sudan. Also for the statistical analysis, a total of 38 African countries were selected for the analysis as some countries lacked data for the dependent variable and therefore would have influenced the study to a greater extent. Table 4 below provides a list of countries included in the statistical analysis.

3.5.1 Data Collection Methods and Instruments

Secondary data used for the descriptive and statistical analyses for this study has been amassed from various sources including; World Bank reports and databases such as the World development indicators (WDI), World Governance Indicators (WGI) and The Africa infrastructure ports, railways and airports databases; The Global Economy database, African Development Bank (AfDB), DIVA-GIS database, United Nations Conference on Trade and Development website (UNCTAD) and African Country's profiles and progress reports on foreign investment flows, and state and development planning of transport infrastructure. The dependent variable - FDI Network data (2006-2016) was obtained from FDI Markets data.

3.6 Validity and Reliability

Thiel (2014) describes validity as the extent to which a researcher has measured what they intended to measure through a clear and well-articulated operationalization framework. Also, the author opines reliability as the consistency and accuracy with which the variables in the operational framework were measured (Thiel, 2014). Similarly, the accuracy and meticulousness of the measurement technique that range from surveys or observation structures adopted in a study is referred to as reliability (Cooper and Schindler, 2014). Validity on the other hand may be understood as the usefulness of the instruments used to measure the constructs under study (McGoey, Cowan, et al., 2010). The different forms of validity may be categorised into: internal validity which focuses on the cogency of a study in terms of establishing a causal relationship between the independent and dependent variables of a study through the use of appropriate research instruments; and external validity that is the degree to which the results of the study can be generalised for the whole population, settings and times (Thiel, 2014).

In this research, the use of secondary data posits several challenges that have the potential of influencing the reliability and validity of this research. However, this research applies the use of a panel dataset for a period of 11 years (2006 to 2016) for all the indicators that were available for this study in an effort to overcome the challenges encountered during secondary analysis. As most data used in secondary analyses is collected for a different purpose, the variables and indicators selected as proxies for the concepts under study derived from available scientific literature are appropriate and thence enhance the validity of this research. Also, conclusions from various publications used in the development of this research allow for triangulation of the results thus enhancing the cogency of the study. Theil (2014) indicates that triangulation uses numerous data sources, methods and techniques to confirm and corroborate the results of a study. Furthermore, assumption tests carried out during the statistical analysis of the panel data using STATA software prior to the panel regression add to enhanced validity of this study. Moreover, the indicators used were obtained from similar studies that have analysed the effect of infrastructure integration on economic growth and development of regions. Hence, the reliability and replicability of this study is guaranteed for this and future studies.

3.7 Data Analysis Techniques

This inductive research is founded on the conceptualised notion that transport infrastructure integration leads to enhanced regional economic competitiveness for African countries. To understand the relationship between transport infrastructure and FDI, the analysis has been carried out in two stages- descriptive and inferential analyses.

3.7.1 Descriptive analysis

Descriptive analysis provides an account of the data used in the analyses for this study. Graphs developed from STATA and Ms Excel software together with central tendency measures have been used to illustrate the data.

i. FDI network data: This comprises of FDI data showing the flow of investments from one African country to the other. The data used is the value of investments expressed as the current value of United States Dollars (USD).

ii. Network analysis: For analysis purposes, the sum of the total value of investments into and between each African country and regional bloc was first aggregated for the period between (2006-2016) which was then used to generate five different maps in the ArcMap software. Preparation of this data facilitated the analysis that showed how foreign direct investments are distributed across the continent and the investment flow of FDI within the regional geographical blocs and to the entire continent.

iii. Thematic maps: these are maps prepared using the ArcGIS software to present the nature and distribution of the data used for transport infrastructure analyses.

To explain the relationship between regional transport infrastructure integration and regional economic competitiveness, a correlation analysis between the dependent variable (FDI) and significant variables operationalised above was done. This form of descriptive analysis will show strongly related the variables of study are (Thiel, 2014).

3.7.2 Inferential Analysis

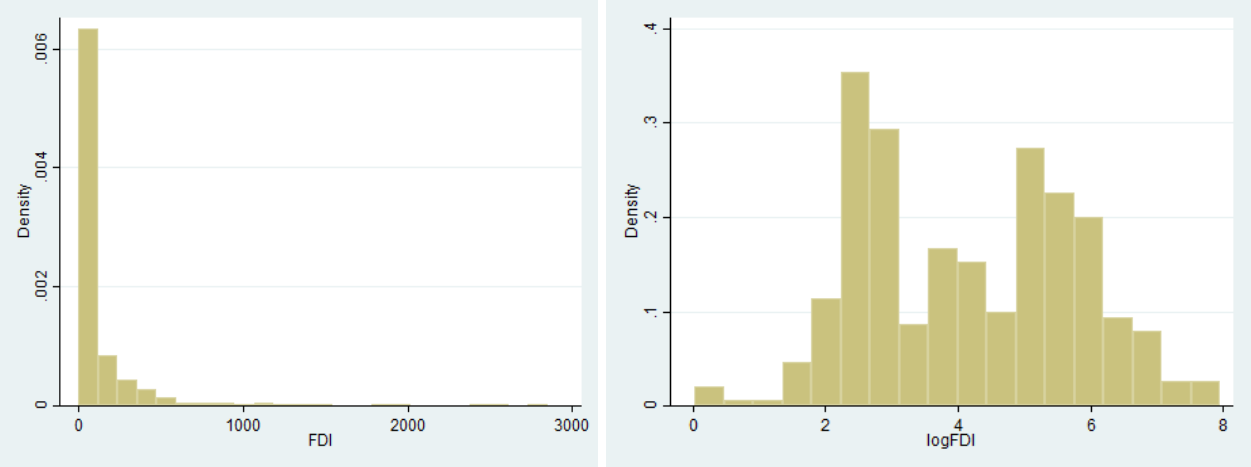
In preparation of the data for statistical analysis, the first step involved checking the data for any irregularities, missing information and for any errors through data inspection; which Theil (2014) reiterates to be a vital step in any analysis even though it is a time-consuming exercise. Apart from this, recording, categorising and processing of the data was carried out to ensure that the operationalised data was standardised and conformed to the quantitative nature of the data used in statistical analysis. This entailed assigning measurable constructs that were used for analysis using MS Excel, ArcMap and STATA software.

Accordingly, panel regression analysis to determine the magnitude of effect between the transport infrastructure integration implementation and the differences between economic competitiveness of regional geographical blocs in Africa; observed through changes in the flow of FDI between the period of 2006 and 2016 has been applied. It was anticipated that for regions with well-integrated transport infrastructure, greater FDI flow would be observed between the country's as a result of trade facilitation through connectivity of transport infrastructure; and hence greater regional competitiveness of the geographical bloc. Following up closely, different combinations of independent variables were put together with the dependent variable to identify specifically which factors influence the relationship between the four different modes of transport infrastructure under study and foreign direct investments for the African continent.

The steps involved in the OLS regression analysis carried out in the STATA software for the panel data applied in this study are described below. Each of the steps entail a series of assumption tests applied to the data prior to the panel regression analysis.

i. Descriptive: the commands browse, describe, and summarise are applied at this data to inspect if the data is in the right form before the assumption tests were applied. This also involved data transformations of any string variables to numeric variables, development of natural log variables for the dependent variable FDI to correct for skewness. The figure below shows the histogram of FDI and that of the logarithm of FDI

Figure 2: Histogram of FDI and Log of FDI



Source: Author 2017, Based on FDI markets data (2006 to 2016)

ii. **Linearity test:** this test identifies whether each of the independent variables exhibit a linear relationship with the dependent variable by the interpretation of the two-way scatterplot graphs. To correct for any variable that did not present a linear relationship the natural logarithm of square root was generated. Corrected independent variables that did not meet the criteria were not included for further analysis.

iii. **Normality test:** the assumption for this test is that the generated residuals or errors in the data are normal. The study applied both the graphical and non-graphical tests to check for normality. A correct graphical test generated using Kernel density shows a curve similar to a bell curve of the residuals while the non-graphical Shapiro Wilk test generates an insignificant value of W to indicate the data is normal. These tests were applied to the panel data set for all regression tests and the results were positive.

iv. **Multicollinearity test:** the Variance Inflation Factor (VIF) null hypothesis is that the independent variables used together in the analysis are not correlated such that they are measuring the same concept. A positive test results in indicators with a VIF value greater than ten (>10) being removed from the regression analysis. For this study, there were some variables that were eliminated after this test to maintain a proper model for the panel regression.

v. **Homoscedasticity test:** this test is founded on the assumption that the variance in the residuals should be constant or homoscedastic. A scatter plot between the predicted values and the residuals or errors is generated and analysed accordingly which is later followed by the non-graphical test that provides a reliable result. The Breusch Pagan test based on the hypothesis that residuals are constant is then applied to provide the acceptable result for this test. A significant result indicates the presence of heteroskedasticity in the data set that should be corrected using a robust command when carrying out the panel regression. The panel data set used in this analysis was positive and the variance in the residuals were homoscedastic.

vi. **Model specification test:** this test is based on the assumption that the regression model has no omitted variables where a significant result of the F statistics indicates that there are variables that have not been included in the analysis or that there may be irrelevant variables included in the analysis and thus incorrect. As part of the model specification, the linktest is applied to test the assumption that the error term does not correlate with the independent variables. When the p value result is insignificant the model is specified correctly.

vii. **Test for independence:** the test is based on the assumption that there is no first order autocorrelation between and within the dataset entities. An insignificant result of the p value for this test accepts the assumption stated. A significant result would require an overhaul of the regression model

viii. **Check for influential points:** influential points occur when an observation with a large error term also known as outliers combine with leverage points which are observations with extreme values on independent variables. The nonexistence of these points has significant effect on the coefficient estimate. The Cooks' Distance measure was used to eliminate any influential points in the dataset to allow for correct computation of the coefficient.

ix. **Hausman test:** this test is used to identify whether a Fixed effects (FE) or a Random effects (RE) model will be applied in the final regression analysis for a panel dataset. The null hypothesis for the Hausman test is that the differences in the coefficients are not systematic; meaning that they are random where the unique errors (ui) are not correlated with the regressors. Thence, a significant result for this assumption test would require a fixed effect model for the analysis.

Fixed Effects model (FE):

According to Torres-Reyna (2007) a fixed effect model explores the relationship between the predictor and outcome variables within an entity such as a city or country. Since different entities have unique characteristics that in one way or the other may influence the predictor variable, the assumption in this model is that such factors need to be controlled for when running the model. The FE model eliminates the effects of such factors such as (size of a country which does not change over time) to allow for correct assessment of the independent variable on the dependent variable. Hence, due to such unique characteristics of the entities, this models' error term and constant should therefore not be correlated with that of others otherwise incorrect inferences of results will occur. Similarly, FE model can only support the inferences of the group or entities under study

The equation for the fixed effect model is:

$Y_{it} = \beta 1 Xit + \alpha i + uit$ [eq.1]

Where

$\alpha i = (i=1...n)$ is the unknown intercept for each entity (n entity-specific intercepts).

Y_{it} = is the dependent variable where i = entity and t = time.

X_{it} = represents one independent variable

β_1= coefficient for that independent variable

u_{it} = error term

Random Effects model (RE):

Dissimilar to the FE model, in the RE model the assumption is that the differences across entities is random and there is no correlation with the independent variables under study (Torres-Reyna, 2007). The Random effects model is appropriate if the researcher has reason to believe that the outcome variable is influenced by spatial differential entities.

The random effects model equation is:

$Yit = \beta Xit + \alpha + uit + \varepsilon it$

where

uit= within entity error

εit=between entity error

Unlike the fixed effects model, the results obtained from a random effects model can be generalised beyond the sample population and also used to make conclusions about the population or entities from which the subject are drawn. Again, in the RE model, time invariant variables such as size may be included in the model as opposed to the FE model where such variables are absorbed by the intercept.

All the four-regression analysis passed the standard assumption tests described above (Normality, Heteroscedasticity, Serial correlation- auto correlation and the Model specification tests). Equally, the Hausman tests for the four different regression analyses carried out on the panel dataset resulted in the selection of a Random effects model.

3.7.3 Panel Regression

This analysis employs panel data also known as cross-sectional time- series data or longitudinal data; which looks at the development of phenomena such as countries, individuals and company activities over a period of time (Torres-Reyna, 2007). Panel data in this research enabled comparative analysis for regional transport infrastructure within the African continent and the influence it has on the economic competitiveness of the various regional geographical blocs measured using the flow of foreign direct investments. To add on, analysis of the implementation of international transport policy agreements, socio-political stability and the development and extent of transport infrastructure among African countries is facilitated by the use of panel data; since the dynamics and differences among the entities are well captured using longitudinal information (McManus, 2011).

Initially, the intension of this research was to analyse the impact of transport infrastructure integration for the regional geographical blocs that included a pane analysis of all the 54 African countries. However, inadequate data for some countries led to their exclusion. The list of countries according to regional geographical blocs applied in the statistical analysis is provided below

Table 4: List of countries included in the statistical analysis

	Regional Geographical Blocs in Africa			
S/No.	**North**	**East**	**West**	**Southern**
1.	Algeria	Burundi	Benin	Angola
2.	Egypt	Democratic Republic of Congo	Burkina Faso	Botswana
3.	Libya	Ethiopia	Cameroon	Malawi
4.	Morocco	Kenya	Chad	Mozambique
5.	Tunisia	Mauritius	Congo Republic	Namibia
6.		Rwanda	Cote d'Ivoire	South Africa
7.		Sudan	Gabon	Swaziland
8.		Tanzania	Gambia	Zambia
9.		Uganda	Ghana	Zimbabwe
10.			Guinea	
11.			Guinea-Bissau	
12			Liberia	
13			Nigeria	
14.			Senegal	
15.			Sierra Leone	

Source: Author, 2017 Adopted from the United Nations Geographical Regions Classifications. Department of Economic and Social Affairs of the United Nations Secretariat (UN/DESA, 2014)

Chapter 4: Research Findings

4.1 Introduction

The following discussion presents the study research findings founded on the analytical and statistical analyses carried out. The chapter first outlines the descriptive analysis and the various outcomes in section 4.2 while the inferential analysis discussed in section 4.3 is based on the regression analyses. Graphs, tables, maps and charts have been used to present findings for this research.

4.2 Descriptive analysis

4.2.1 Trend of Foreign Direct Investments

As discussed, FDI in this research has been used as the measure of regional economic competitiveness for the four regional geographical blocs in Africa. The secondary data used in this analysis was available for almost all the 54 African countries for the panel period between 2006 and 2016. Again, this study combines the data from Sudan and that of South Sudan and its analysis interpreted as one country due to the availability of data for the other indicators for only 53 countries excluding South Sudan.

As the African continent and the world as a whole continues to experience globalisation and economic growth at a rapid pace, countries and regions are making continuous efforts to improve their factor endowments in order to augment their position in the overall global economy. With that, there exists competition at city, country and regional levels as to which economy presents the best characteristics that match up to the global competitiveness index; which comprises of the indicators and requisite conditions of a well performing economy. Consequently, having met the pre-set standards of competitiveness, countries and regions may then be fit to attract significant foreign investments. This in turn stimulates economic growth and eventually leads to overall integration into the global economy. Foreign direct investments for instance have for a long time been used as a measure of economic competitiveness. Countries and regions therefore aspire to have high foreign investment activities to achieve competitiveness by having multinational corporations and enterprises trading across regional markets achieved by enhancing openness to trade; high levels of innovation and productivity; availability of natural resources; and an industrious labour market. All these initiatives are supported by a well-integrated transport infrastructure system connecting the different countries and regions in a network.

For this research, regional economic competitiveness of regional geographical blocs under study for the period between (2006 and 2016) is measured using FDI. Table 5 below provides a summary of the FDI data used in this research.

Table 5: Summary of FDI

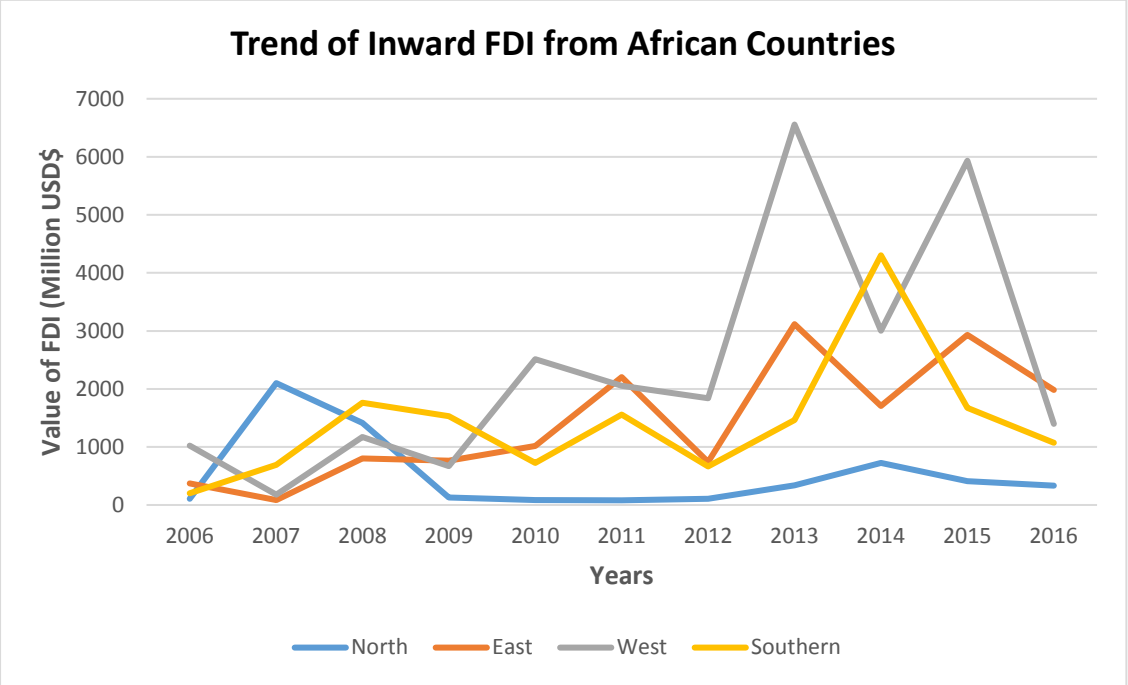
Variable	Obs	Mean	Std. Dev.	Min	Max
logFDI	341	4.154059	1.614802	.0295588	7.95525

Source: Author 2017, Based on FDI Markets data (2006-2016)

This data was prepared by aggregating the total FDI into African countries from the rest of the continent. Regional level analysis was made by aggregating the total FDI for the African

countries located in each regional bloc. As a result of missing values in the panel dataset, the number of observations for FDI reduced to about 341 despite having a panel dataset that had an initial target of about 583 observations for the 11-year period between 2006 and 2016 for all the 53 African countries. As a result, only 38 countries were considered in the statistical analysis.

Figure 3: Line graph showing the trend of FDI flow between African countries (2006 to 2016)



Source: Author 2017, Based on FDI Markets data (2006-2016)

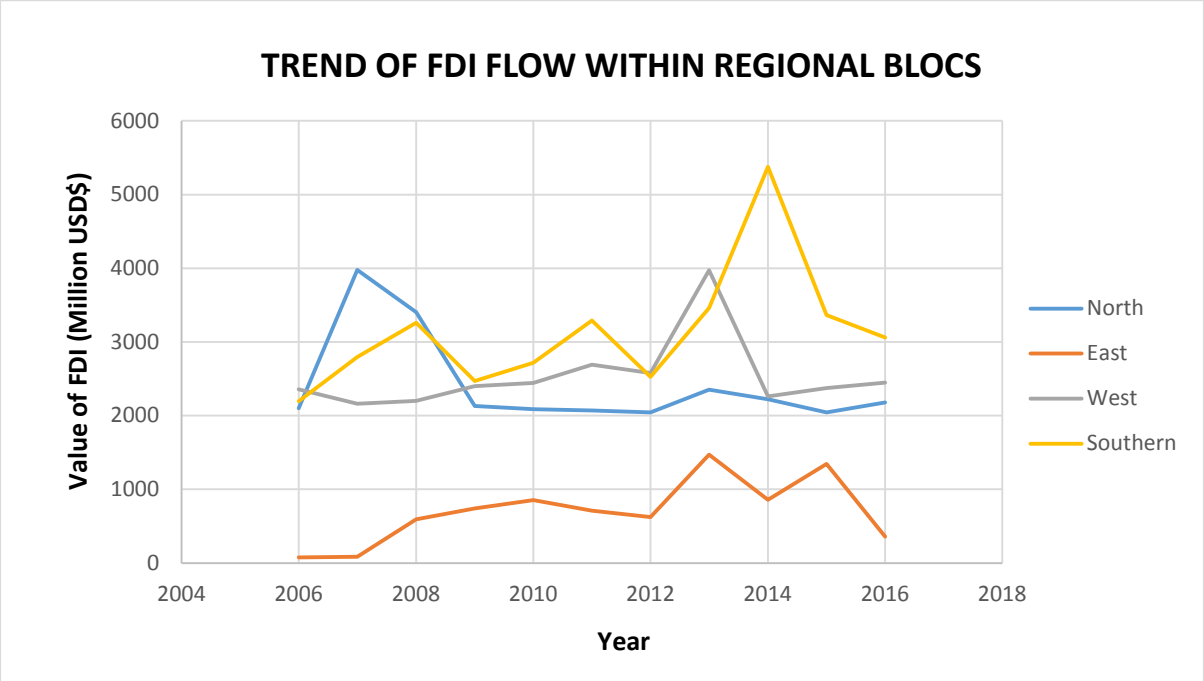
Figure 3 above shows the trend of inward FDI flow from between African countries computed at regional level for the period between 2006 and 2016. It can be seen that inward FDI flow has been volatile for the East, West and Southern geographical blocs over the years. North Africa on the other hand had its peak of FDI inflow from African countries in the year 2007 and from then on a down ward trend can be observed prior to the stable flow recorded between 2009 and 2012. The trend for the northern region then gradually picked up in 2014 before stabilising in 2015. It may then be inferred that North Africa received very low FDI from other African countries and more from countries outside the continent. Alternatively, the highest surge in FDI within the continent through-out the entire was recorded for West Africa for the year 2013 where a value of about 6600 (million USD$) was recorded whereas the lowest drop was recorded for North Africa in 2011 where only 80 (million USD) was received from the rest of the continent.

4.2.2 Regional Economic Competitiveness across the geographical blocs in Africa

Regional geographical blocs in Africa are quite uneven as each of them have unique historical and cultural characteristics that influence the competitiveness of each bloc. The Southern bloc's economic activity for instance is known to be dominated by South Africa due to its progressive economic development and political history and therefore commands more economic competitiveness in terms of foreign investments from within and outside of the African

continent. The following shows a trend analysis of FDI network flow within the regional geographical blocs. This graph is a compilation of FDI investment values within each bloc for ever year over the 11 years.

Figure 4: Line chart showing the trend of FDI network flow within regional blocs (2006 to 2016)



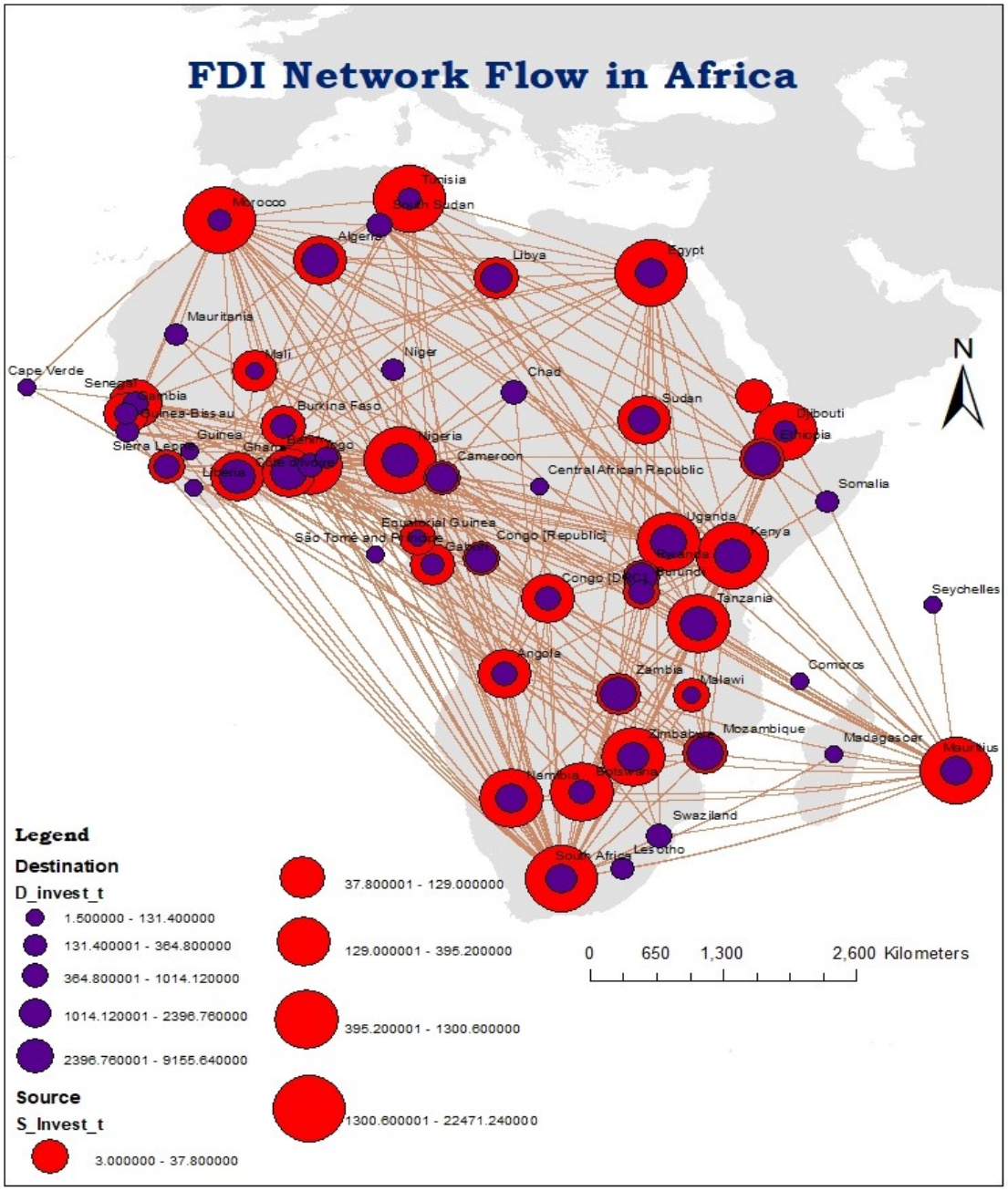
Source: Author 2017, Based on FDI Markets data (2006-2016)

Similarly, figure 4 above depicts a comparison of the total investment flow of FDI for the period between 2006 and 2016 within the four regional geographical blocs under study. From the data, East Africa is seen to be the lowest performing bloc compared to the rest of the regional blocs; barely reaching a total investments flow of 1500 (million USD) during its peak year in 2013. In the same way, the Southern regional bloc appears to be the best performing region. Despite the small number of countries in the bloc, the regional investment flow within the regions out-performs that of either the East, West or Northern bloc. Between the years of 2012 and 2014, the southern bloc improved tremendously with investments peaking by more than doubled the investments recorded in the year 2012. This suggests that the Southern bloc has factor endowments that facilitate the progressive flow of investments between its countries.

Conversely, despite the doubled soar in FDI within the Northern regional bloc experienced in the one-year period between 2006 and 2007, the entire region appears to have reached a trough and inevitably levelled off its total regional investments between the years 2007 and 2012. The trend in the region hardly picked up in 2013 before dropping consistently in 2014 and 2015. Again, the Western regional bloc can be said to have been on an upward trajectory for the period between 2008 and 2011 before reaching a high of about 4000 (million USD) despite minor instabilities observed in 2007 and 2012. In the same way, the region's largest slump occurred in the year 2014 and has since been improving since 2016. The Western bloc may then be said to have made continuous improvements in its endowments to actualise the expansion of FDI flow between its countries. Overall performance of regional FDI flow of investments within the blocs can be ranked in the following order; Southern bloc, West, North and lastly the Eastern region. In comparison to the general performance of the blocs as a whole, the negligible improvement shown by the Western and Northern bloc in 2015 was not enough to mitigate the slump observed for the other two blocs in the same year. Nevertheless, the

collective strengthening of the regional blocs' investment activity between 2012 and 2013 supported the overall continental take off of investment initiatives within the same period.

Figure 5: Map showing FDI network flow in Africa as at 2016



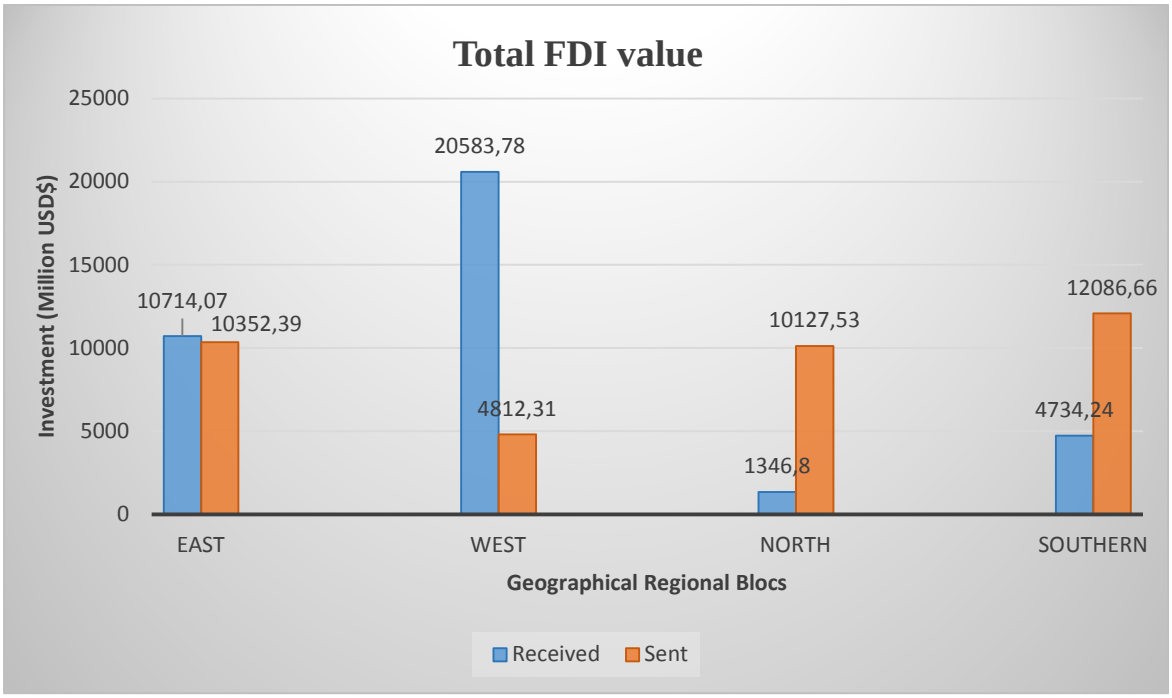
Source: Author 2017, Based on FDI Markets data (2006-2016)

Figure 5 above shows the total FDI network flow of investments in Africa for the period between 2006 and 2016. The red circles show the source countries while the purple circles show the destination countries. From the map, it can be seen that Morocco, Tunisia, South Africa, Mauritius, Kenya and Nigeria are the most crucial investors of FDI into other African countries; while Cote d'Ivoire, Mozambique, Algeria, Ghana, Zambia, Libya and Ethiopia are among the largest receivers of FDI within the continent. Again, it can be inferred that Eritrea is the only country in Africa that does not receive FDI from other African countries whilst there

are other countries such as Lesotho, Swaziland, Chad, Niger, Comoros, Seychelles, Madagascar, Somalia and Cape Verde that do not invest FDI into other African countries.

The following graph figure 6 shows the total FDI values in (million USD$) received into the four geographical blocs from the rest of Africa, while also showing the total investment value sent from each regional bloc to the rest of the continent as at 2016. It can be seen that cumulatively the West African bloc emerges as the highest receiver of foreign investments; while the Southern Africa regional bloc invests the most into other regions. In addition, the Eastern bloc appears to have invested and received almost the same value of investments, whereas the West African region has invested about 23 percent of the total received. Above all, the Northern bloc has cumulatively received the least value of investments from other African regions.

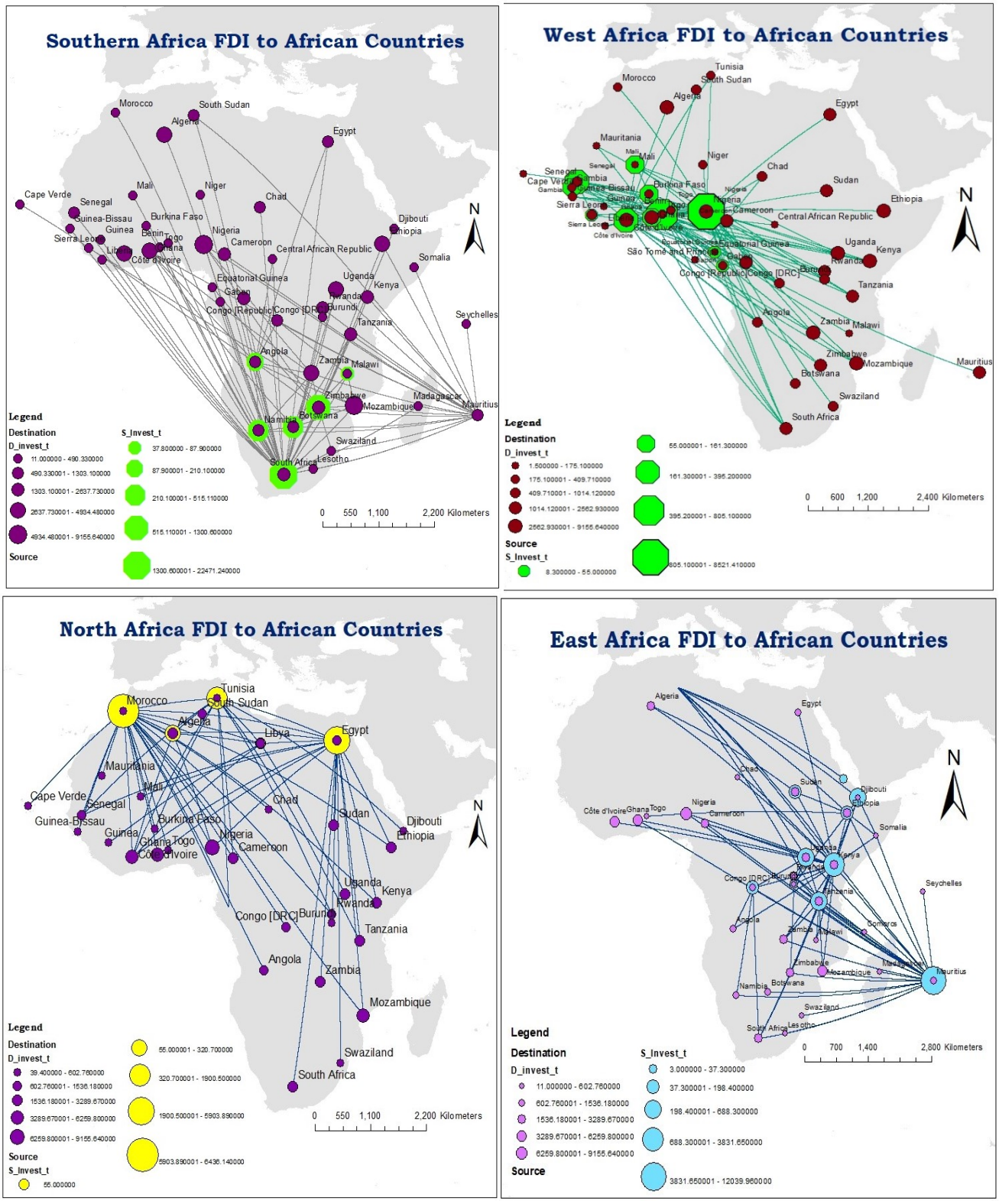
Figure 6: Clustered column chart showing total FDI flow between regions as at 2016



Source: Author 2017, Based on FDI Markets (2006-2016)

Figure 7 below show the FDI network flow from each of the four regional geographical blocs under study for the period between 2006-2016. The maps show that all the regional geographical blocs within the continent invest in countries within each geographical bloc with the Southern bloc investing the most into African countries and Western Africa receiving the highest value of FDI in the continent cumulatively during the study period.

Figure 7: Maps showing FDI flow from the regional blocs



Source: Author 2017, Based on FDI Markets (2006-2016)

4.3 Transport Infrastructure Integration across the Regional Geographical Blocs

4.3.1 Water Transport

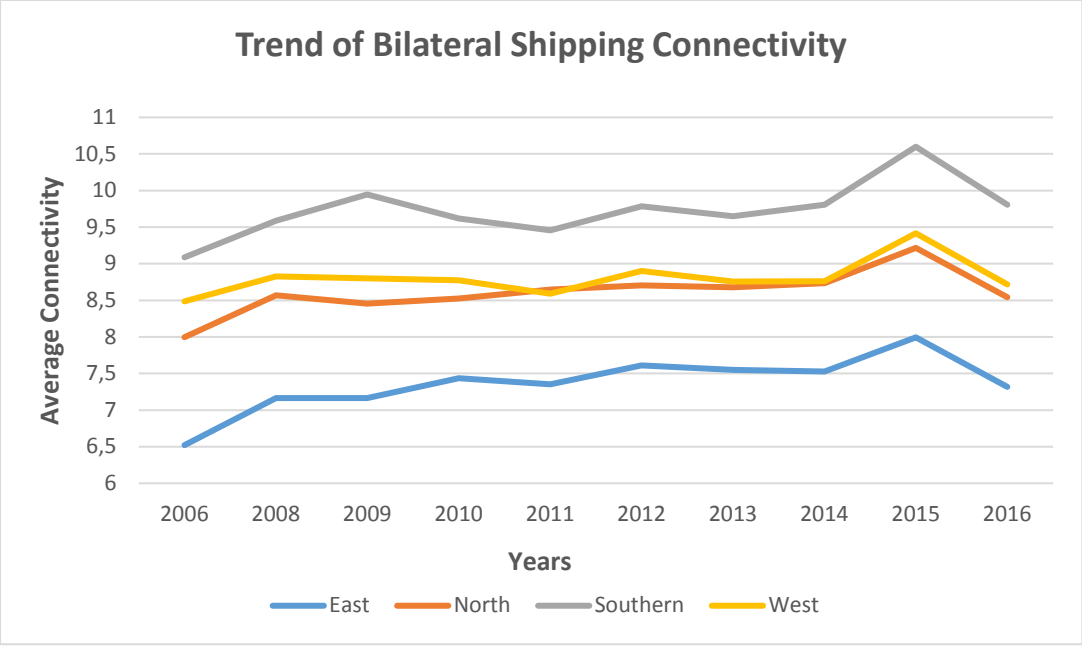
Table 6 below describes the data used in the statistical analyses to represent water transport infrastructure. The data includes the liner shipping bilateral connectivity index (LSBCI), the quality of port infrastructure and container port traffic (TEU: 20-foot equivalent units) indicators. From the data, the Liner Shipping Bilateral Connectivity Index (LSBCI) looks at the direct and indirect shipping connectivity between two countries over time had the highest observations. The container port traffic (TEU: 20-foot equivalent units) measures the flow of containers from land to sea transport modes and vice versa, in twenty-foot equivalent units (TEUs) which is the standard-size container. The indicator recorded the lowest observations because there was no data available for the years 2015 and 2016 hence the missing values in the analysis. The quality of port infrastructure is computed as a rank where 1 is extremely underdeveloped while 7 is well developed and efficient by international standards.

Table 6: Water transport variables

Variable	Obs	Mean	Std. Dev.	Min	Max
LSBCI	380	8.415476	1.674451	0	12.75356
Qlty_porti~r	349	3.655576	.7887082	1.371974	5.641185
Container_~c	184	969407.1	1644721	57478	8810990

Source: Author 2017 Based on UNCTAD and WDI databases 2006-2016

Figure 8: Line graph showing the trend of bilateral shipping connectivity

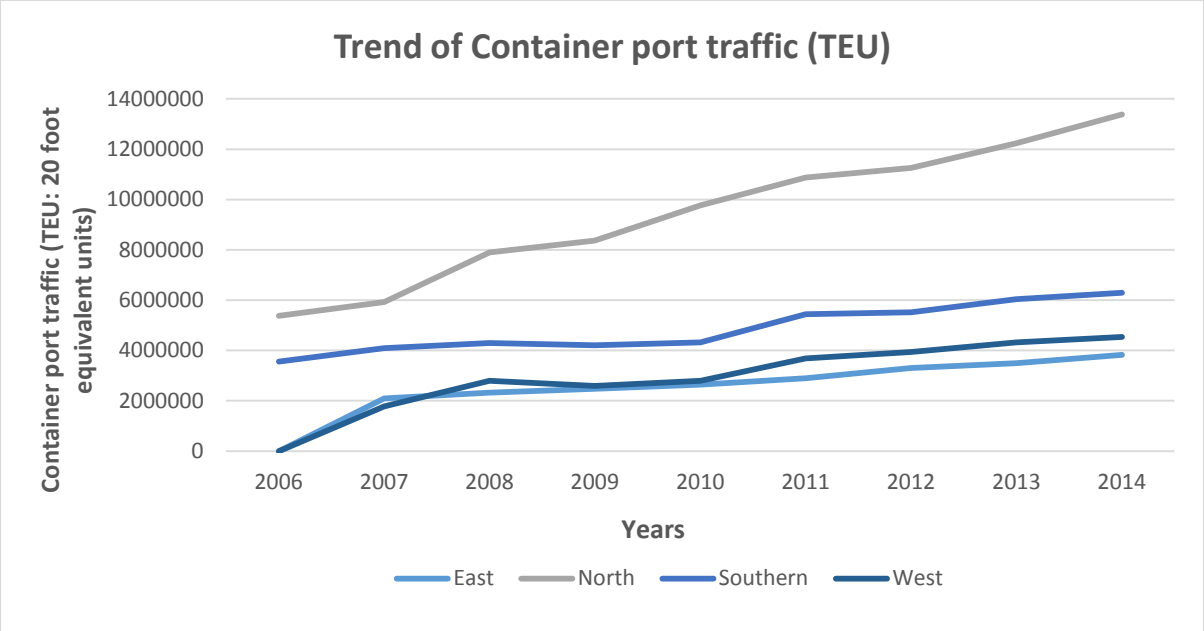


Source: Author 2017 Based on the LSBCI 2006 -2016

The above graph depicts the average shipping connectivity between 38 African countries in the four geographic blocs with a direct and indirect connection based on the liner shipping bilateral connectivity index (LSBCI) for the period between 2006 and 2016. The index is made up of

five components; namely: the least number of transhipments required to move from one country to the other; the number of direct connections between two countries in a pair that is the optional connections that a shipper has when moving goods from one country to the other. It can be infrerred from the graph that until resently (2016), shipping connectivity within the blocs has been expanding all through the duration of the study period with a few negligible fluctuations observed in the years 2009, 2014 and 2014 for the Eastern bloc; 2010, 2011 and 2013 for the Southern bloc; 2011, 2013 and 2014 for the Western bloc and 2009 and 2014 for the North. The greatest fall so far was recorded in 2016 while the highest top out for the blocs was observed in the year 2015. Hence, North Africa may be said to be the most stable in terms of port transport connectivity with almost no fluctuations observed during the years. The Eastern bloc shows continuous improvement through out the years despite being the lowest performer in terms of port connectivity witin the bloc when compared to the other blocs. According to the data, the Southern bloc is the best performing region in terms of port connectivity with the highest average value recorded in 2015 (10.6) while the West Africa's connectvity compares closely to that of the Northern bloc which also appears to be stable.

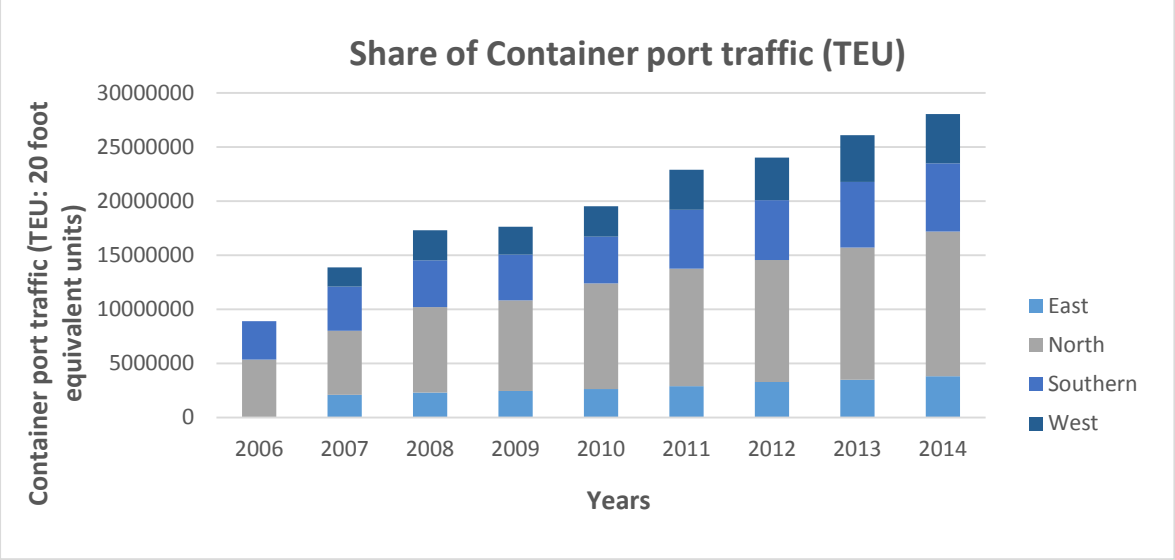
Figure 9: Line chart showing the trend of Container Port Traffic (TEU)



Source: Author 2017 Based on WDI 2006-2014

Figures 9 and 10 present the trend and share of Container Port Traffic (TEU) for the four regional geographical blocs for the period between 2006 and 2014. From the two graphs, it can be seen that as at the year 2006 the Eastern and West African blocs did not contribute to the continental share of container port traffic. Besides accumulating the largest share of port traffic, North Africa, the appears to expand the volume of container traffic every year showing a progressive upward trend compared to the rest of the regions over the years. The second-best performer in terms of container port traffic which is the South African bloc portrays stability and a gradual rise in the volume of containers as shown between the years 2007 and 2010 and an increase from 2011 to 2014. Similarly, the West and Eastern regions have shown a rise in the volume of containers shipped over time with a slight dropped recorded for West Africa in the year 2009.

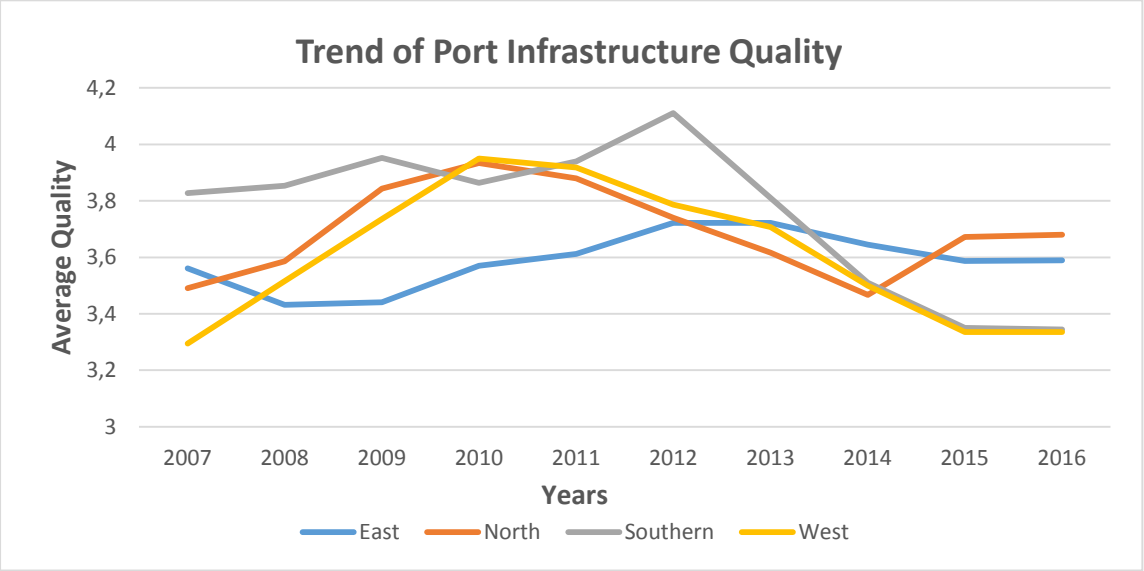
Figure 10: Stacked column chart showing the share of Container Port Traffic (TEU)



Source: Author 2017 Based on the WDI 2006-2016

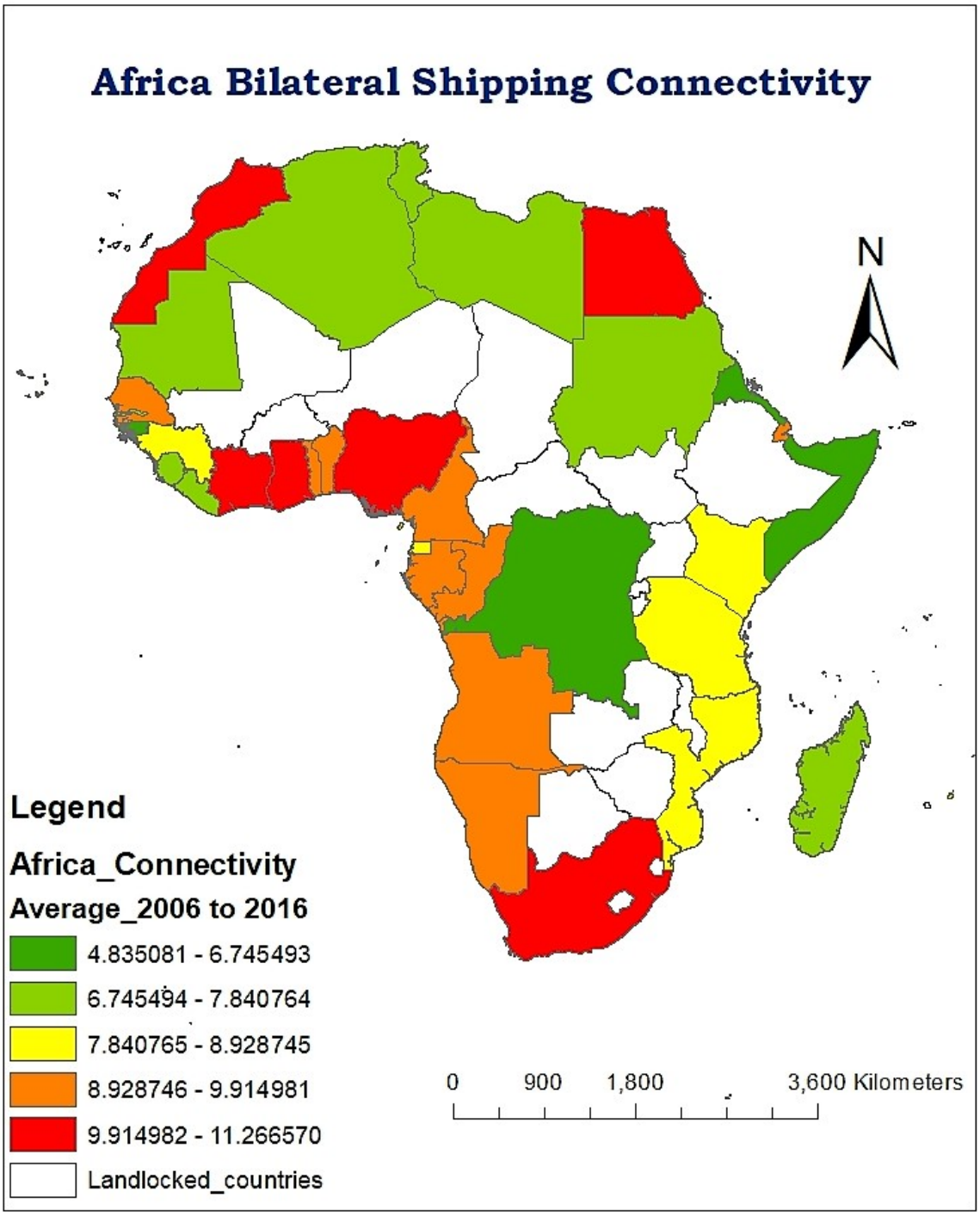
Figure 11 below shows the average quality of port infrastructure of the blocs for the period between 2007 and 2016. As seen from the graph, the trend of average quality of port infrastructure for the North and Western blocs appears to be similar for the period between 2007 up until 2014 where efforts to improve the quality of port infrastructure per acceptable international standards grew steadily from 2007 and peaked in 2010 at an average quality value of (3.9) and dropped to a low of 3.5 and 3.3 for the North and Western blocs respectively. The South African bloc records the highest quality of port infrastructure (4.1) in 2012 while the lowest quality recorded was for West Africa for 2015. This trend in the year 2010 large investments of infrastructure were made for the Eastern, Western and Northern blocs that all recorded and expansion during that year but as time progressed the quality in the West and Northern blocs depreciated while that of the East and Southern blocs continued to improve. However, between 2012 and 2014 the four blocs showed a drop in the trend and an unchanged situation for all the blocs between 2015 and 2016.

Figure 11: Line chart showing the trend of Port Infrastructure Quality



Source: Author 2017 Based on the WDI 2007-2016

Figure 12: Map showing the average bilateral shipping connectivity in Africa (2006 to 2016)



Source: Author 2017 Based on the LSBCI 2006-2016 (UNCTAD)

In addition, figure 12 above displays the map of average liner shipping bilateral connectivity for African countries for the period between 2006 and 2016 based on the LSBCI. From the map, it can be seen that the countries with the highest shipping connectivity value include South Africa, Egypt, Morocco, Cote d'Ivoire, Ghana and Nigeria all marked in red whereas the Democratic Republic of Congo, Guinea-Bissau, Eritrea and Somalia display the lowest value of average connectivity over the years despite their proximity and direct access to potential port network facilities - open water resource. This suggests that issues such as the geographical make-up of countries, political and trade liberalisation issues may be some of the bottlenecks

hindering the success of bilateral port connectivity of the low performing countries. The map also shows the landlocked countries in Africa that mainly access shipping connectivity through their transit countries (Hoffmann, J. and Fugazza, M., 2016). It appears that the West African bloc has the highest number of countries with above average to high values of shipping connectivity while the East African region contains the most number of countries with average values of shipping connectivity within the continent. This suggests that West Africa has greater potential of advancing its bilateral shipping connectivity than East or Southern Africa.

4.3.2 Road Transport

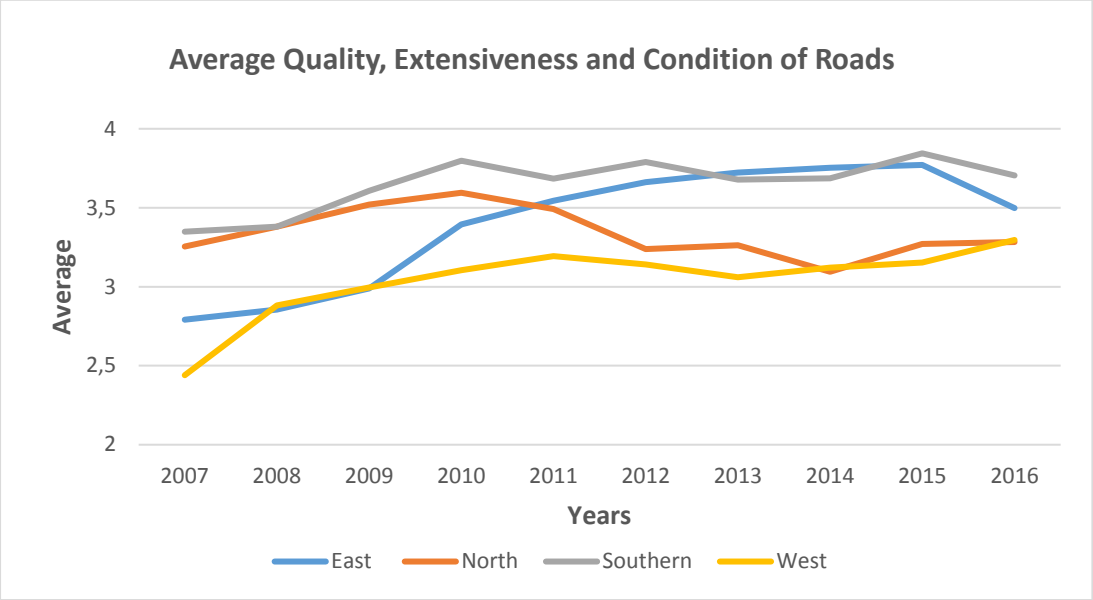
For the most part, road transport being the most widely available transportation mode might suggest the availability of data on the total coverage of routes in kilometres for countries, the number of passengers and goods transported. In contrast, for the present study, data on road transport (roads total routes in kilometers and passenger transported by road) is scanty and outdated as coverage is only up to the year 2012 for the panel period under study. Nevertheless, this research used the data on quality, extensiveness and condition of a country's roads infrastructure obtained from the Global Competitiveness Report (GCR) that had 347 observations for the period between 2007 and 2016. Table 7 below provides the description of the dataset used to represent road transport infrastructure.

Table 7: Road transport variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Roads_qlty	347	3.351729	.8660991	1.46	5.83

Source: Author 2017 Based on the GCR 2007-2017

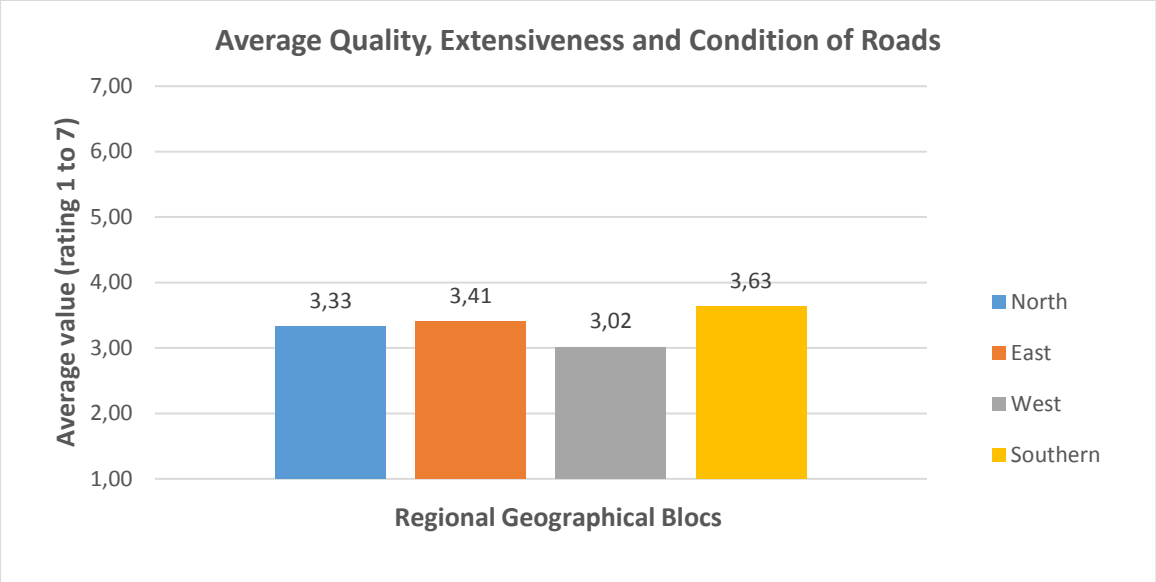
Figure 13: Line graph showing the average quality, extensiveness and condition of road infrastructure



Source: Author 2017 Based on the GCR 2007-2016

Figure 13 above presents the average quality of roads data for 41 African countries based on the Global Competitiveness Reports data for the period between 2007 and 2016 computed for each geographical bloc. The average values have been computed using a scale of 1 to 7 where 1 represents extremely poor (among the worst in the world) quality, extensiveness and condition of road infrastructure while 7 represents extremely good (among the best in the world). It can be deduced from the graph that though there have been fluctuations with the values that represent the extensiveness, condition and quality of the roads, there has been positive progress for all regions throughout the years. East Africa shows the smoothest curve with a continuous growth trend observed from 2009 to 2015 whilst the Southern region shows a trend with the most fluctuations. In comparison, North Africa shows a constant downward trend in the condition, quality and extensiveness of road infrastructure between the years 2010 and 2014. Likewise, figure 14 below shows the total average quality, extensiveness and condition of road transport in Africa for the four geographical blocs as at the year 2016. A quick look at the graph indicates that Africa in general ranks low per the world standards with 3 out of 4 of its geographical blocs scoring below average on road infrastructure. Above all, the graph also shows that in totality over the years, the Southern bloc records first place with an average value of (3.63) suggesting more extensive and better conditions of roads in the continent than that of the other blocs that record (3.41), (3.33) and (3.02) for the East, North and Western geographical blocs respectively.

Figure 14: Clustered column chart showing average quality, extensiveness and condition of roads as at 2016



Source: Author 2017 Based on the GCR 2007-2016

4.3.3 Rail Transport

Table 8 describes the variables used in this study which include; rail lines (total route-km), goods transport by rail (million ton-km) and passengers carried by rail (million passenger-km) all obtained from the World Development Database. For a panel dataset of 11 years (2006-2016) for 38 countries about 418 observations were expected. However, this particular dataset barely had 200 observations for each indicator. This is presumed to have been influenced by the missing data for quite a number of years selected for the panel analysis.

Table 8: Rail transport variables

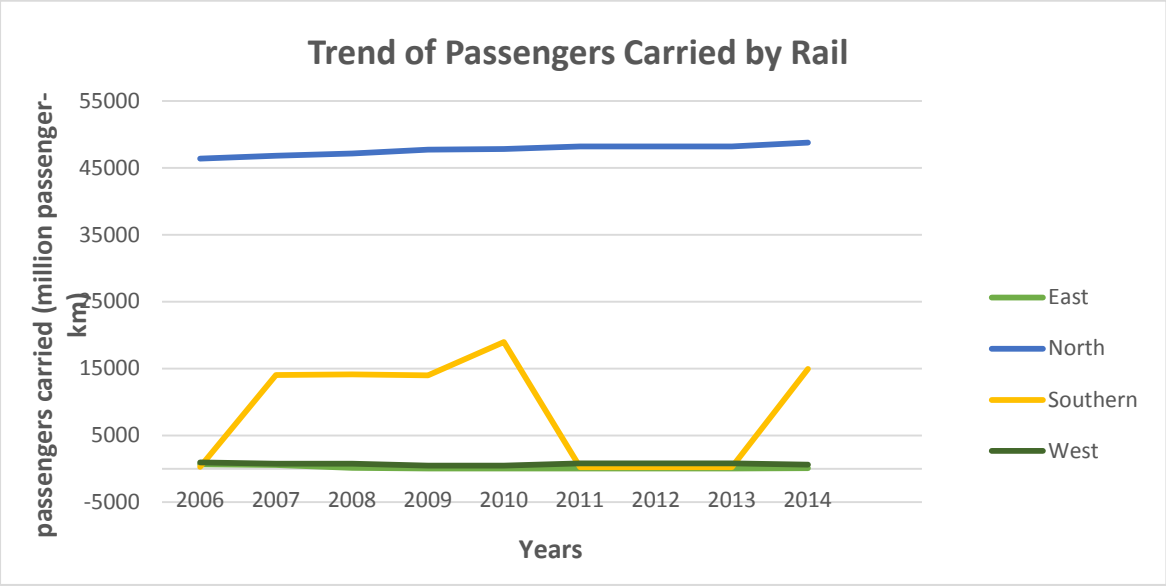
Variable	Obs	Mean	Std. Dev.	Min	Max
Raillinest~m	147	3349.609	4966.632	300	24487
Rail_goods~n	132	9509.756	28464.34	1	134600
Rail_passe~s	115	4502.284	11043.26	.068	40837

Source: Author 2017 Based on WDI (2006 -2015)

Figure 15: Line graph showing the trend of goods transported by rail (2006 -2014)

Source: Author 2017 Based on WDI (2006-2014)

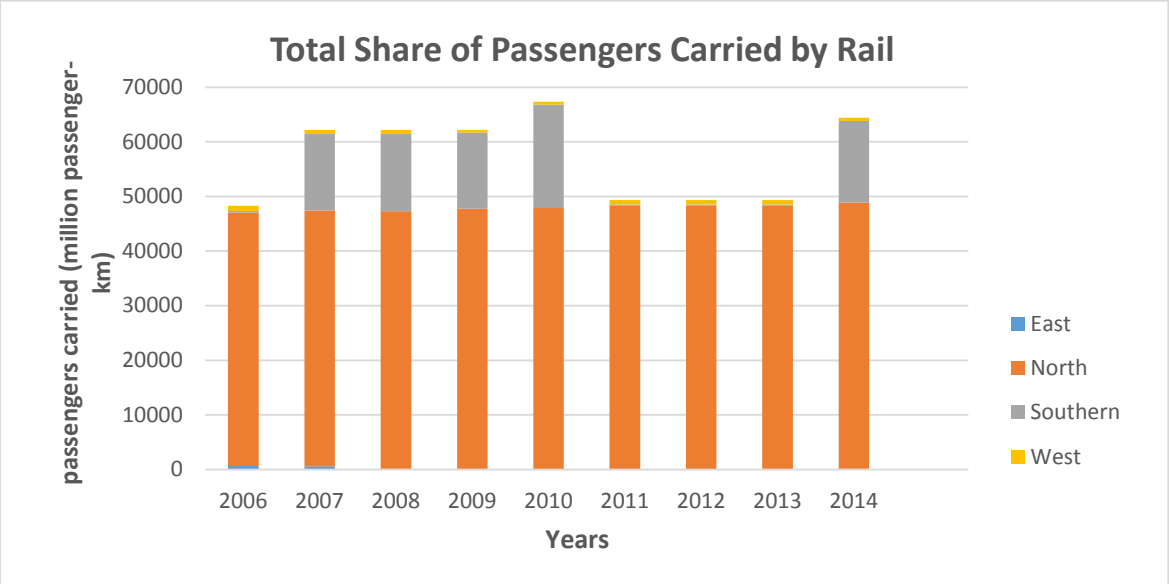
Figure 16: Line chart showing the trend of passengers carried by rail (2006 -2014)



Source: Author 2017 Based on World Development Indicators (2006-2014)

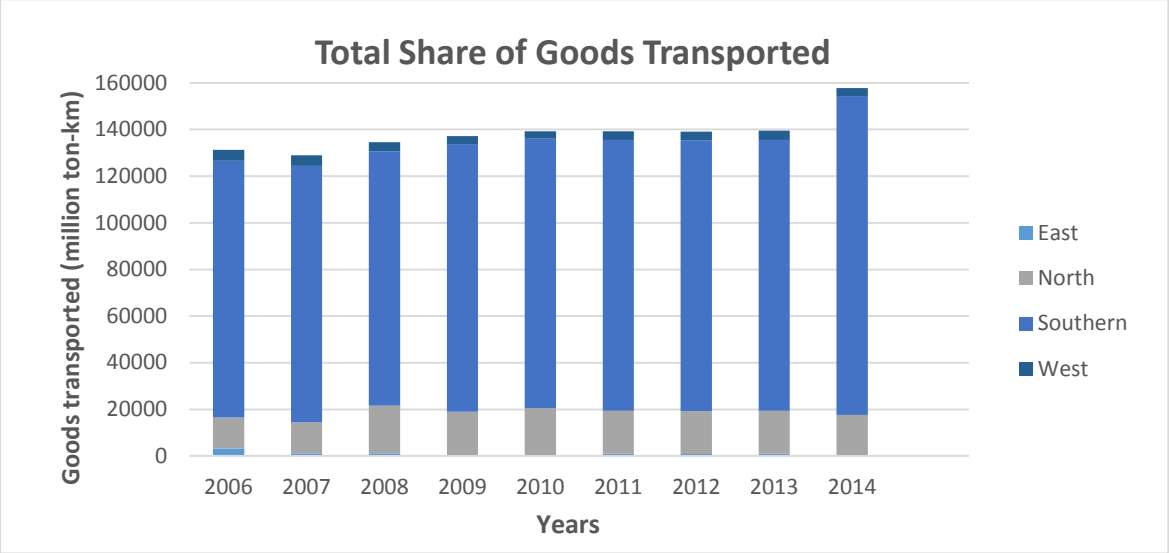
Figures 15 and 16 above present the trends of goods transported and passengers carried by rail infrastructure for the regional blocs between 2006 and 2014. It is clear from both graphs that the Southern bloc achieves better than the other blocs in terms of railway transport for cargo movement whilst North Africa remained the top performer in the movement of passengers through rail over the years. the East and Western regons however show a consistent trend in both the number of people and cargo transported by rail over the years whilst the Southern bloc records the largest drop in the number of passengers transported between 2011 and 2013 suggesting a depreciation in either the rail services or infrastructure between the years prior to the increase observed in 2014. Figures 17 and 18 show the share of passengers and goods transported by rail over the years, dominated by the Northern and Southern geographical blocs respectively.

Figure 17: Stacked column chart showing the share of passengers transported by railway (2006 - 2014)



Source: Author 2017 Based on data from WDI (2006-2014)

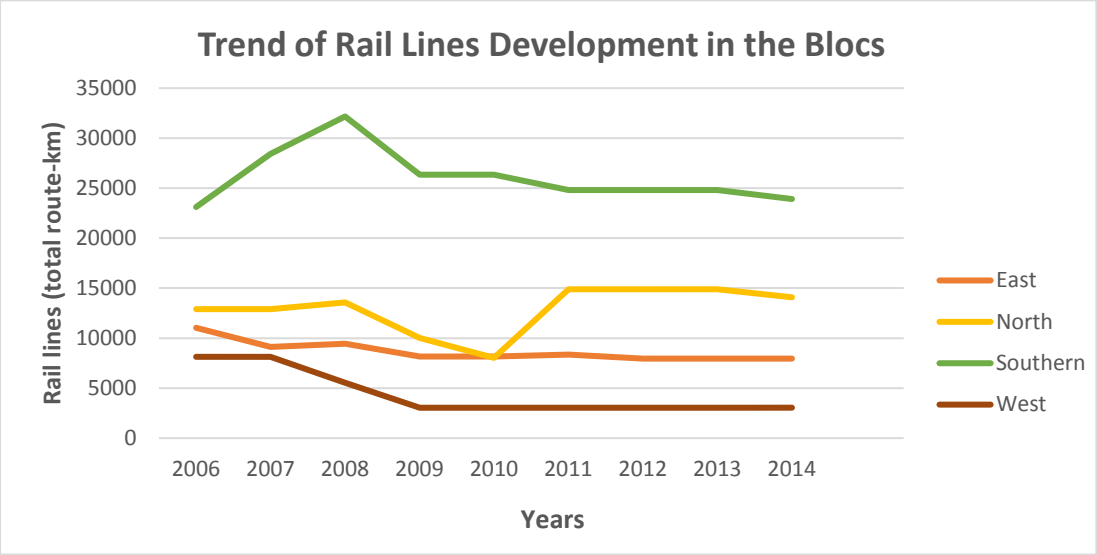
Figure 18: Stacked column chart showing the share of goods transported by railway (2006 - 2014)



Source: Author 2017 Based on data from WDI (2006-2014)

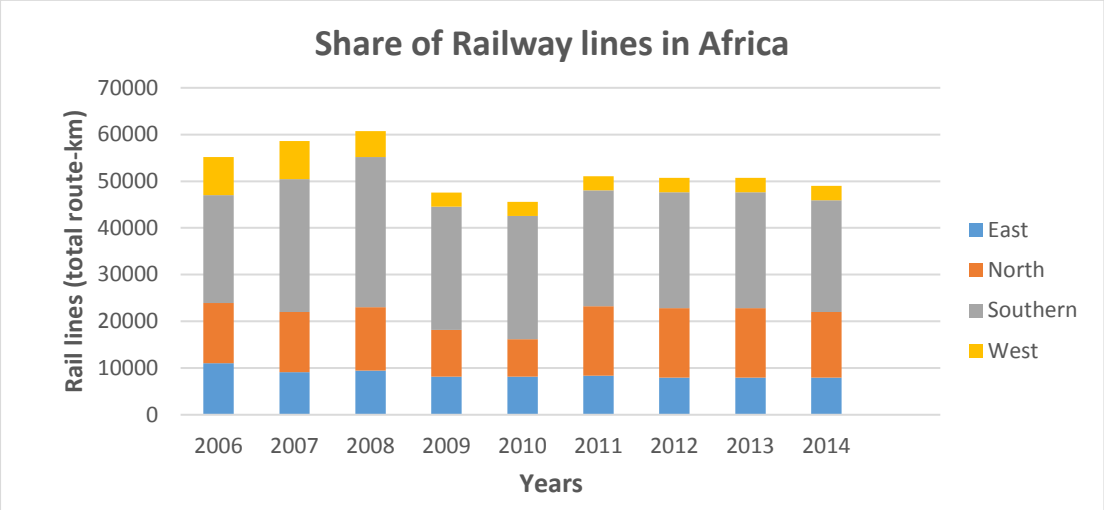
Figure 19 below shows the trend of railway infrastructure development within the continent for regional blocs with rail infrastructure for the period between 2006 and 2014. According to the data, the Southern bloc undisputedly has the highest concentration of railroads infrastructure within the continent with 32171 kilometres of rail lines recorded for the region in 2008. It however displays a gradual decrease in this from the year 2008 to 2014. The West African has the lowest railway line development record dropping in rail network from 2007 to 2009 and subsequently stabilizing until 2014. Similar performance was recorded by the Eastern bloc though at higher rail route concentration than the Western region. An interesting pattern is what is displayed in railway development within the Northern bloc where a great trough is recorded between 2008 and 2011 with the lowest point in railway coverage of (8032 kilometres) for the region recorded in 2010. Generally, the greater share of railway infrastructure as represented in figure 20 throughout the 11 years studied in this research was maintained by the Southern bloc followed by the North, East, and Western regions.

Figure 19: Line graph showin the trend of rail lines development within the regional blocs



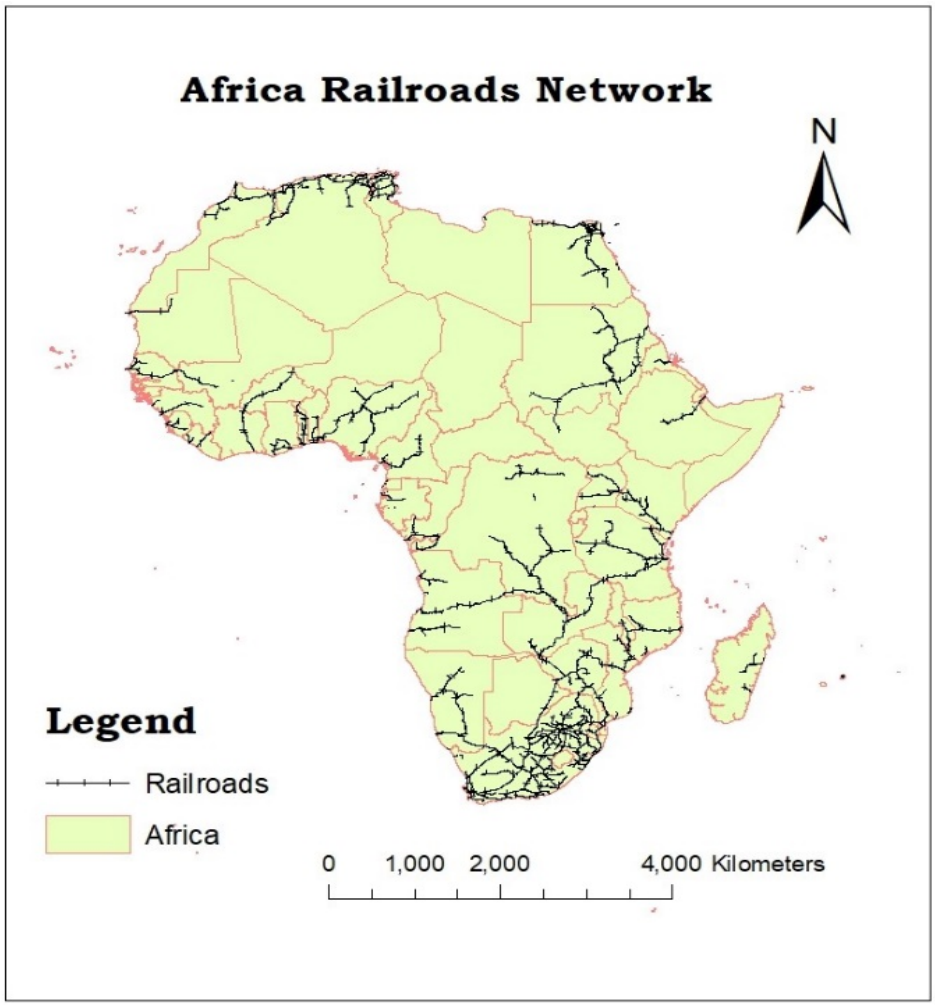
Source: Author 2017 Based on data from WDI (2006-2014)

Figure 20: Stacked column chart showing the regional share of railway lines over time (2006 - 2014)



Source: Author 2017 Based on data from WDI (2006-2014)

Figure 21: Map of railroad network in Africa



Source: Author 2017 Based on data from DIVA-GIS website (2016)

Figure 21 above shows the total railroads infrastructure network in Africa as at 2016. It can be inferred from the map that the highest rail connectivity appears to be concentrated within the Southern bloc where the rail infrastructure can be seen to expand to other countries within the bloc. In the same way, rail infrastructure connectivity between the regional blocs is seen to connect the East to the Southern network. The Northern bloc appears to be isolated from other blocs however the rail network present in Sudan shows potential of linking to Egypt to enhance integration. Again, the rail network in the Western bloc shows potential of connecting to the East and to the Northern bloc when investment initiatives are geared towards enhancing integration efforts within the continent.

4.3.4 Air Transport

The variables used to represent air transport infrastructure in Africa for the panel period between 2006 and 2016 are described in Table 9 below. The variables contain sufficient data as the observations recorded adequately represent the panel data required for 38 countries of about 481 observations in an ideal situation. The variables include registered carrier departures worldwide which includes both domestic and international departures registered from a country; freight (million ton-km) that contains the volume of freight, express, and diplomatic bags carried from take-off to landing measured in metric tons multiplied by the kilometres

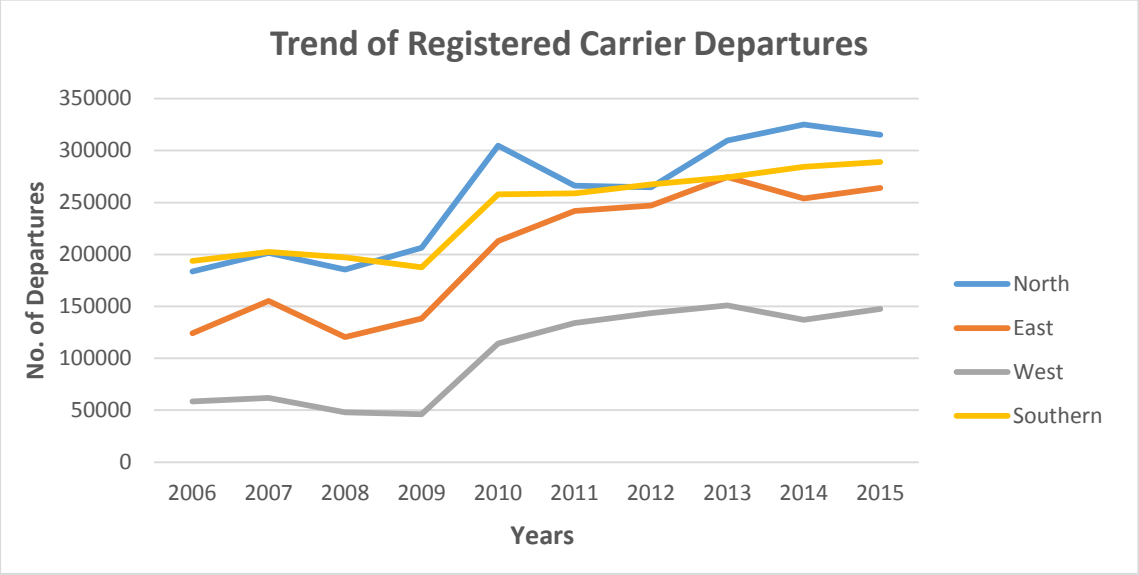
travelled and lastly air passengers carried both for domestic and international flights for air carriers registered in African countries.

Table 9: Air transport variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Freight	370	81.96457	216.1497	0	1490.381
Passengers~d	399	1700063	3147533	0	1.95e+07
Reg_carrie~e	397	22838.05	35895.32	0	218103.2

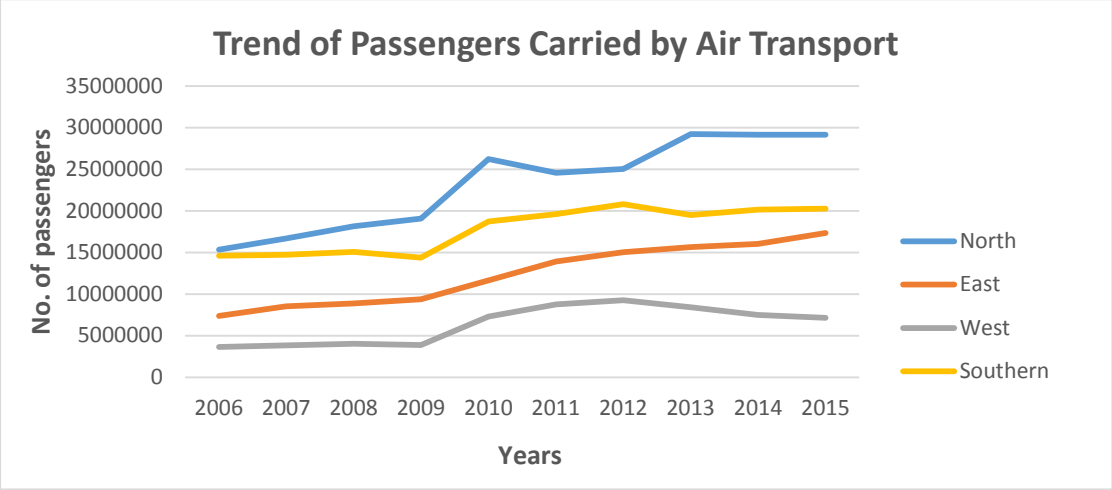
Source: Author 2017 Based on data from WDI (2006-2015)

Figure 22: Line chart showing the trend of registered carrier departures in Africa (2006 to 2015)



Source: Author 2017 Based on data from WDI (2006-2015)

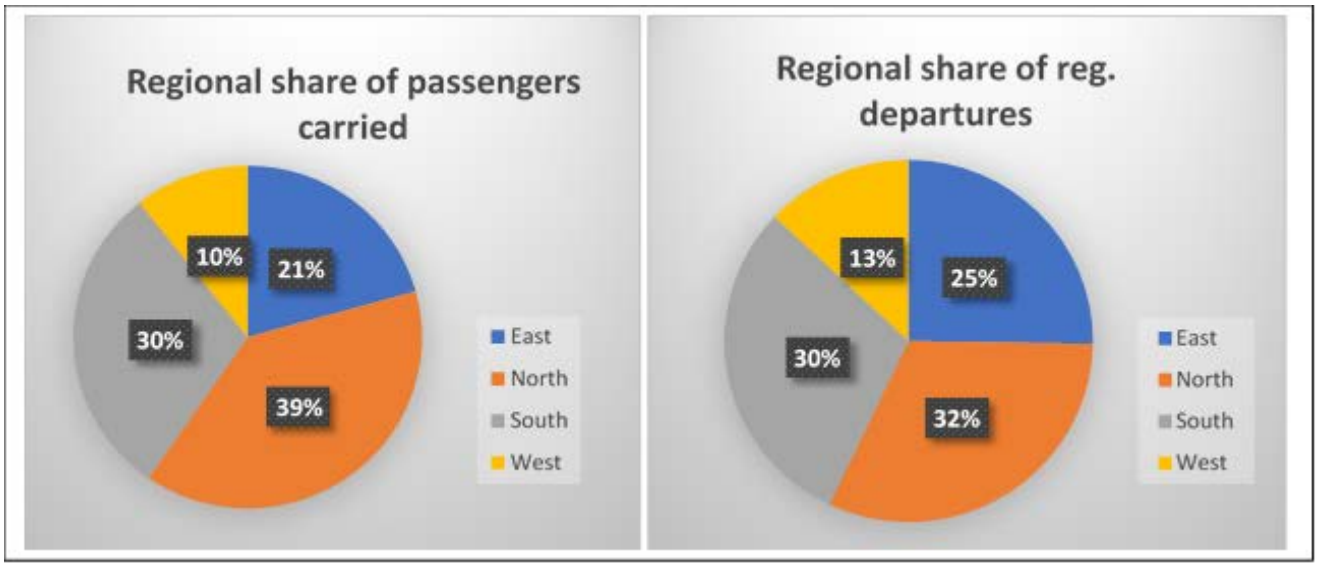
Figure 23: Line graph showing the trend of passengers carried in Africa (2006 to 2015)



Source: Author 2017 Based on data from World Development Indicators (2006-2015)

Figures 22 and 23 above depict the trend of registered carrier departures and that of passengers carried by air transport respectively for the period between 2006 and 2015. It is observed from the graphs that the Northern bloc performs the best among the four blocs in these two indicators of air transport. This may suggest that the air transport sector in North Africa is much more developed compared to the other regions. West Africa on the other hand lags behind in air transport development in the entire period for both indicators. Noteworthy however, is the fact that all the four bocs have improved in their respective performance over the years. Implying gradual efforts to develop the air transport sector within the blocs and on the continent as a whole. Cumulatively as shown in figure 24 below, the Northern bloc maintains the highest share of both passengers carried and registered carrier departures from the region as at 2015. The Southern region maintains its position as the second best region in the continent whilst West Africa remained the least competitive in terms of air transport performance.

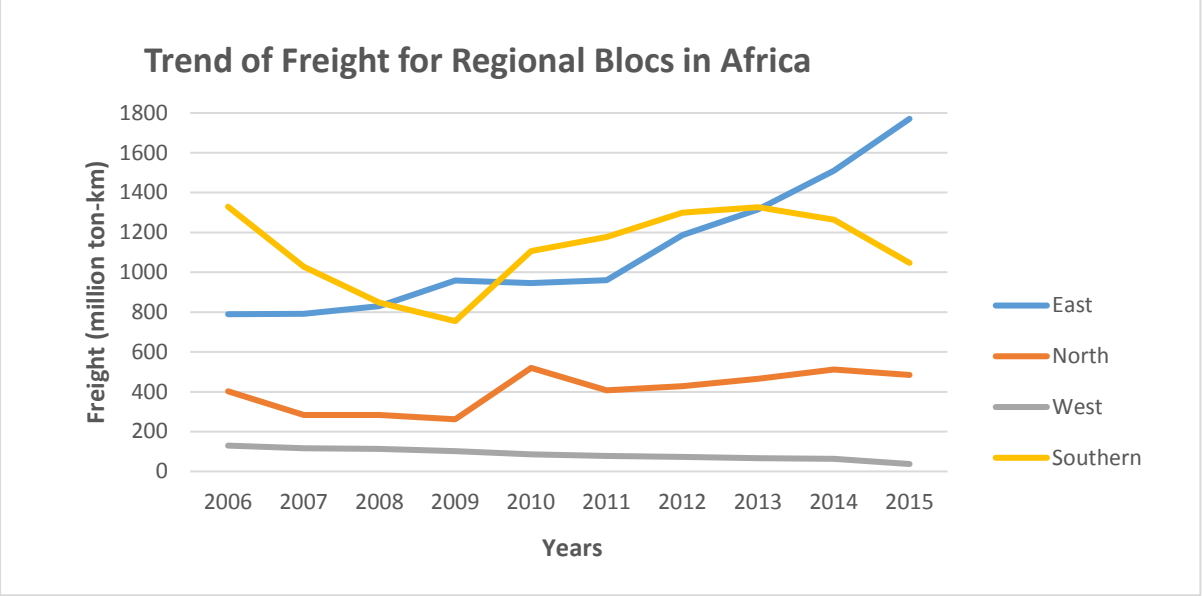
Figure 24: Pie charts showing the regional share of passengers carried and registered carrier departures as at 2015



Source: Author 2017 Based on data from World Development Indicators (2006-2015)

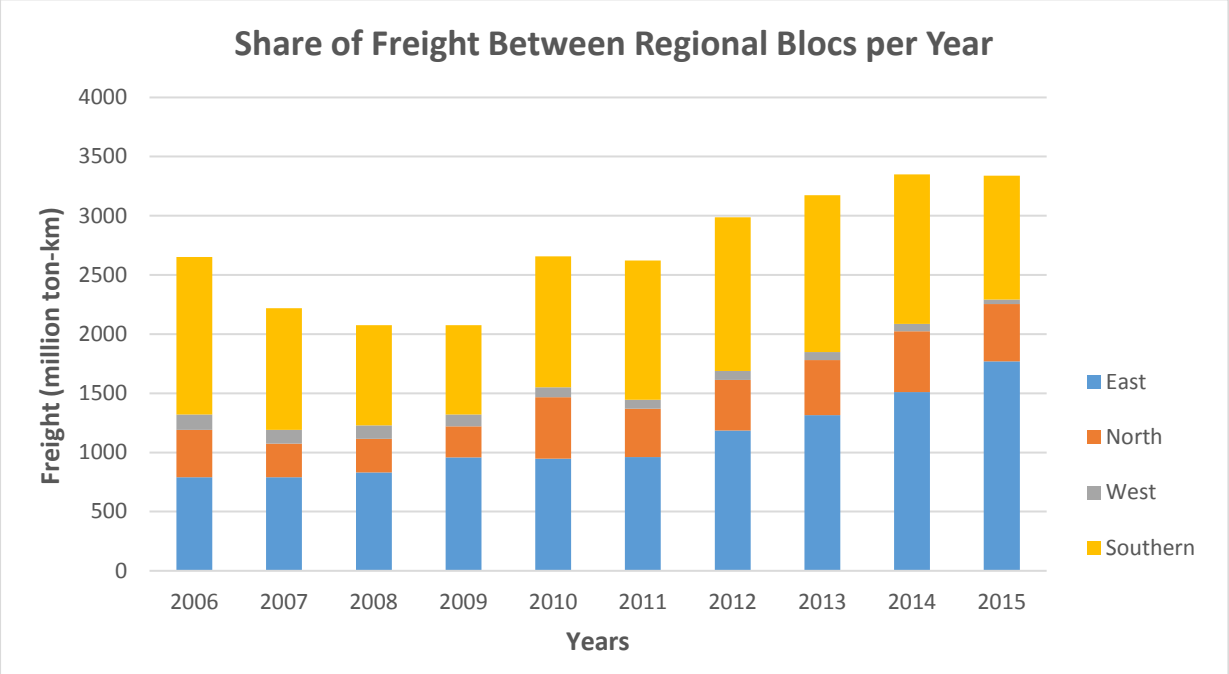
For volume of freight transported by air, the graphs in figures 25 and 26 below represent the trend and share of freight transported respectively from the year 2006 to 2015. It is not surprising to see West Africa still showing the least performance in freight transport by air. The other blocs in this sector have shown varied performance with East Africa starting at a lower record (800 million ton-kilometre) transported in 2006 and eventually expanding to the highest record observed (1770 million ton-kilometre) in 2015 on the continent. Admittedly, such performance was realised by its steady improvement in the sector over the 11 years; a feat which could be attributed to concerted efforts to advance the air cargo sector. Conversely, the South and Northern blocs experience some downward trend from 2006 to 2009 before picking up 2010 with a steady progress up until 2015. Such performance by the four blocs is reflected in their share of freight recorded for each year presented in figure 26 below where East Africa grew its share in the continental air freight volumes.

Figure 25: Line graph showing the trend of freight transported in Africa (2006 to 2015)



Source: Author 2017 Based on data from WDI (2006-2015)

Figure 26: Stacked column chart showing the regional share of freight transported in Africa 2006 to 2015



Source: Author 2017 Based on data from WDI (2006-2015)

The map presented in figure 27 below shows the concentration of airports in Africa with the highest concentration observed within the West African bloc. It is ironical that this high concentration does not account for better performance but rather as discussed above; the region's air transport indicators were the least among all the four geographical blocs in the continent. Same can be said for the Eastern bloc which despite its sparsely populated airports recorded the highest performance in air freight transport over the years.

Figure 27: Map of Airports in Africa

Source: Author 2017

4.4. Inferential Analysis

4.4.1 Extent to which regional transport infrastructure integration contribute to FDI in East, West, North and Southern Africa

The relationship between transport infrastructure integration for regional geographical blocs in Africa with economic competitiveness for this research was analysed by the extent to which transport infrastructure connectivity discussed above, relates with FDI. This is elaborated in the following section where the results of the different panel regression analyses are presented. The four regressions carried out all used the random effects (RE) model and thence the results may be generalised for the larger African continent.

4.4.2 Correlation Analysis

To establish how interrelated the variables of study are to FDI, a correlation analysis between the independent variables was carried out for all the variables that represented the four modes of transport infrastructure. For rail transport variables, multicollinearity was a problem between the goods transported (million ton-kilometres) and rail lines (total route- kilometres) and was therefore not included in the analysis. Correlation coefficients are presented in table 10 below.

Table 10: Correlation analysis output between significant variables and FDI

	(1) logFDI
LSBCI	0.239***
Roads_qlty	-0.0216
Rail lines (totalroutekm)	0.259**
Freight	0.173**

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

Source: Author 2017

For water transport infrastructure, the liner shipping bilateral connectivity index exhibits the highest correlation with FDI (0.239***). The variable representing road infrastructure had a negative correlation with FDI suggesting that the qualitative indicator on the quality, extensiveness and conditions of roads does not directly influence FDI. In the same way, rail lines (total route- kilometres) and freight transported by air have a positive relationship with FDI as shown in the table above at confidence value of 99% where both indicators suggest a positive relationship between them and FDI.

4.4.3 H1 Improved integration of transport infrastructure will boost FDI flow in Africa

The test for this hypothesis in this study for 38 African countries that form part of the four regional geographical blocs under study correspond with the works of (Khadaroo and Seetanah, 2007, Asiedu, 2002, Abuka, 2005, Kodongo and Ojah, 2016, Asiedu, 2006) that propound on the positive effects of transport infrastructure integration on FDI. Consequently, the hypothesis is confirmed.

The analysis used the same control variables all through the four regression analyses; which include GDP per capita which is a control for market size and population, land area which irons out the effect of the size of a country in influencing the development of infrastructure and lastly Trade (per cent of GDP) to control for openness to FDI. In the same way, the transport composite index (Tcomposite index), GCF (Gross Capital Formation – per cent of GDP) and the political stability index (PSI) were applied to all the four panel regression analyses to observe their mediation capacity as per the literature on the effect of transport infrastructure integration on regional economic competitiveness. Table 11 and 12 below present a description of the control and mediating variables used in the analyses.

Table 11: Control variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Landarea	583	554331.2	621738.3	460	2381741
GDP_Capita	565	2474.301	3475.406	165.8794	22742.38
Trade_GDP	528	79.75841	35.06353	21.12435	311.3553

Source: Author 2017 Based on UNCTAD and WDI databases 2006-2016

Table 12: Mediating variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Tcomposite~x	477	10.05997	13.47975	.285	80.747
PSI	530	-.550283	.9081364	-3.32	1.18
GCF	523	23.41835	9.968742	0	58.82612

Source: Author 2017 Based on UNCTAD and WDI databases 2006-2016

Furthermore, the dummy variable (Region_ID) as shown in table 12 below is coded to analyse the regional effect of infrastructure development on FDI; where all the countries in the analysis were coded per their geographical classification applied this analysis. With reference to North Africa which from literature (AfDB, 2016, AfDB, 2010) emerges as the best performing region in terms of transport infrastructure development the bloc is coded as region 1 all through the analysis. The other three regions East, West and Southern Africa coded as region 2, 3 and 4 respectively are analysed with reference to the Northern bloc.

I. Water Transport Infrastructure Integration between the regional blocs and FDI

In the first regression labelled as model A, in table 13 below, the results of the analysis between water transport and FDI are presented. The table shows the positive and significant coefficient of the Liner Shipping Bilateral Connectivity Index (LSBCI) which indicates a positive effect on FDI with enhanced shipping and connectivity of ports in Africa. According to the analysis, this is realised only when there is improved development and expansion of port infrastructure to facilitate more connectivity; and where there is also investment in fixed assets of an economy such as ports, illustrated by the positive and significant coefficients of the transport composite index and GCF (% of GDP) respectively. The results in model A therefore suggest that in terms of port infrastructure connectivity, West Africa (3. Region ID) has the next best potential of becoming as connected as the Northern bloc. This is explained by the positive and significant (2.282***) coefficient observed among the regional blocs. Just as West Africa appears to be well connected in terms of bilateral shipping connectivity in figure 12 above, the results of the statistical analysis are confirmed. What is more, the Eastern and Southern blocs follow in second and third position in terms of having the highest potential of becoming as connected as the Northern bloc. These results have been obtained from the analysis of 27 countries given that a total of 38 countries were selected for this analysis. Also, model A explains the relationship between water transport infrastructure integration and FDI by 30% at 95 percent confidence level as shown by the R square value. Accordingly, with increased port connectivity between two countries the higher the value of FDI and hence the more competitive a region is.

Table 13: Regression output table

VARIABLES	Model A Water logFDI	Model B Road logFDI	Model C Rail logFDI	Model D Air logFDI
LSBCI	0.312**			
	(0.15)			
Quality of roads		0.359		
		(0.22)		
Rail lines (total route KM)			0.000126*	
			(0.00)	
LogRail_passengers			-0.0561	
			(0.10)	
Freight				0.00105**
				(0.00)
GDP per Capita	-1.11e-05	-6.94e-05	-0.000405***	-7.60e-05
	(0.00)	(0.00)	(0.00)	(0.00)
Land area	7.03e-07*	1.20e-06**	1.04e-06***	6.92e-07***
	(0.00)	(0.00)	(0.00)	(0.00)
Trade (% of GDP)	-0.0106	-0.00539	0.0178**	-0.00211
	(0.01)	(0.01)	(0.01)	(0.01)
Transport composite index	0.0397**	0.0201	0.0581***	0.0245
	(0.02)	(0.02)	(0.01)	(0.02)
GCF (% of GDP)	0.0450**	0.00802	0.0132	0.0287*
	(0.02)	(0.02)	(0.03)	(0.02)
Political Stability Index	-0.186	-0.326	0.834*	
	(0.32)	(0.31)	(0.46)	
2.RegionID - East Africa	2.160***	1.724**	0.507	1.478***
	(0.66)	(0.80)	(0.62)	(0.57)
3.RegionID - West Africa	2.282***	1.491*	1.816***	1.192***
	(0.83)	(0.77)	(0.35)	(0.37)
4.RegionID – Southern Africa	1.937**	1.452**	0.235	1.005**
	(0.76)	(0.72)	(0.89)	(0.49)
Constant	-1.539	1.198	1.779*	2.133***
	(1.85)	(1.37)	(0.96)	(0.59)
R Squared	0.30	0.36	0.75	0.42
Observations	133	150	59	167
Number of Country_id	27	33	18	32

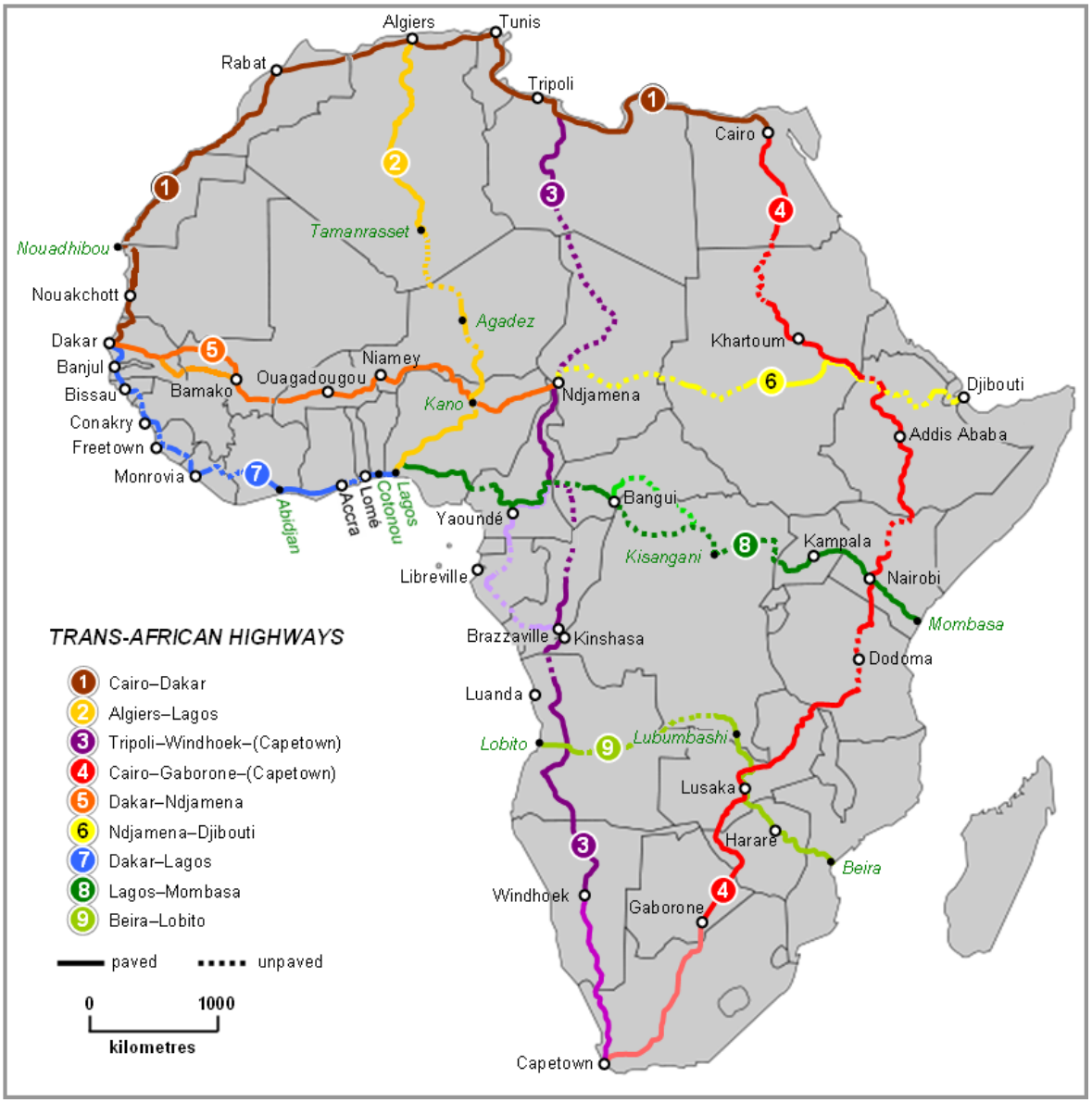
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Author 2017, Based on various sources

II. Road Transport Infrastructure Integration between the regional blocs and FDI

The regression model B in table 13 above explains the relationship between road infrastructure integration and regional economic competitiveness measured using FDI. As discussed, this analysis applies an indicator that represents the quality, extensiveness and condition of roads; which is not significant as shown in the results. The outcome nevertheless has a positive coefficient which is indicative of a positive relationship with FDI. The regional effect from the results suggests that the East bloc (2. Region_ID) has the next best potential of becoming like the Northern bloc in terms of road quality, condition and extensiveness of its network; as it is the best per model B. Also, the South and Western blocs follow closely after the Eastern bloc as the second and third best regions with potential to improve on the same to match up with that of the Northern bloc. This relationship with FDI is explained by 36% as shown by the R square value. Unlike the water transport model where development and the actual investment in port infrastructure of an economy is significant, for road transport, the same are not significant, but the coefficients are however positive.

Figure 28: Map showing the Trans-Africa Highways network



Source: (United Nations Economic Commission for Africa, African Union, et al., 2010)

Figure 28 map above presents the Trans-African Highways (TAH) network under construction in various African countries in the different regional blocs that effort to integrate the different regions in the continent. The map depicts the development of the paved roads using solid lines and the growth of the roads under construction using broken lines. It can be inferred that road transport integration is progressively under way in the continent suggesting that once the regions are well connected, regional economic competitiveness is likely to be realised by the increased flow of FDI.

Figure 29: Status of implementation of the Trans-African Highways (TAH)

Status of TAH

Route	Length (km)	Current Status
TAH1: Cairo–Dakar	8,636	Substantially complete. Major sections in Tunisia, Algeria and Morocco under development into motorways. Missing link is a short desert track around Morocco-Mauritania border.
TAH2: Algiers–Lagos (Trans-Sahara Highway)	4,504	Substantially complete; 200 km desert track in Niger. Usage restricted by border and security controls.
TAH3: Tripoli–Windhoek–Cape Town	10,808	Alignment to be extended to Cape Town. Paved national roads in Libya, Cameroon, Angola, Namibia and South Africa constitute part of the TAH3. Missing links in Chad, CAR, Congo Republic and DRC, including the missing bridge over Congo River between Congo Republic and DRC.
TAH4: Cairo–Gaborone–Cape Town	10,228	Alignment to be extended to Cape Town. The Southern portion is complete: from Cape Town to Kenya. The missing link in Tanzania through Dodoma in central Tanzania is gravel standard, but the paved TanZam Highway from Dar es Salaam provides an alternative route. The earth road in Kenya to Ethiopian border is under construction. Crossing Egypt-Sudan border by road has been prohibited for a number of years; a vehicle ferry on lake Nasser is used instead.
TAH5: Dakar–Ndjamena (Trans-Sahel Highway)	4,496	100 per cent complete in West Africa from Dakar to Fotokol (4,460 km). An alternative shorter route between Senegal and is under construction.
TAH6: Ndjamena–Djibouti	4,219	Contiguous with TAH5. Mostly earth road between Chad and Sudan.
TAH7: Dakar–Lagos (Trans-West Africa Coastal Highway)	4,560	About 80 per cent complete (100 per cent paved in Nigeria, Benin, Togo, Ghana, Côte d'Ivoire, Senegal). Missing links (765 km) in Liberia, Sierra Leone, Guinea, Guinea Bissau. Conditions of highway vary: 9 per cent good; 59 per cent fair; 32 per cent poor.
TAH8: Lagos–Mombasa	6,259	Eastern half (Kenya-Uganda), locally known as TAH is complete; alternative route through Kigali and Bukavu provides link to Kisangani; western portion in CAR, Cameroon and Nigeria mostly complete. Missing link in DRC and parts of CAR mostly due to insecurity and conflict.
TAH9: Beira–Lobito Highway	3,523	Substantially complete. Western portions through Angola and DRC require reconstruction following damage during the war. Alternative east-west links already exist from Maputo to Walvis Bay (Trans-Kalahari Highway).

Source: (United Nations Economic Commission for Africa, African Union, et al., 2010)

An interesting spatial pattern of the regional road network connectivity is observed from the map. All the countries of the Northern bloc for instance appear to have access to the Cairo-Dakar TAH whereas regional connectivity within the Eastern bloc shows that no TAH barely connects through either Eritrea, Somalia, Burundi or Rwanda. West African countries however, present a different pattern to that of the East as almost all the countries along the West African coast have access to the Dakar-Lagos TAH while the inland countries are linked using the Dakar-Ndjamena TAH.

Regional road network connectivity developments observed from the map present remarkable efforts that promote integration between the blocs. For instance, the Dakar-Lagos and the Cairo-Dakar TAH provide optimum connectivity between several countries in North and West Africa; a case that cannot be reported between East and Southern Africa that heavily rely on the Cairo-Gaborone (Cape town) TAH for regional connectivity. Again, a close scrutiny of the map suggests that there are greater efforts to link the Northern region to that of the South through the Tripoli-Windhoek (Cape town) TAH as well as the North, South and Western blocs than linking the Southern bloc to the Northern region through East African countries. Development of a TAH along the coastline that stretches from the North Africa through East Africa to the South would supplement the Cairo-Gaborone (Cape town) TAH that connects the aforementioned blocs.

III. Rail Transport Infrastructure Integration between the regional blocs and FDI

The statistical analysis between railway infrastructure and foreign direct investments is presented in table 13 above in model C. The analysis presents the results of the two indicators used to represent railroads infrastructure to elaborate on the different effects that both indicators have in FDI. As expected, the rail lines (total route kilometres) indicator has a positive and significant coefficient whilst the lograil_passengers that represents the number of passengers transported via rail has a negative coefficient and is not significant. This result is realised with an increase in land area, openness to FDI (Trade per cent of GDP), development in railway infrastructure (Tcomposite index) and political stability. For the regional effect per the analysis, West Africa arises as the next best regions with the potential to become as connected as the Northern bloc is in terms of railroads infrastructure. On the contrary, the negative coefficient on the lograil_passengers suggest that an increase in the number of people transported by rail poses a negative effect on the FDI for African countries. The results of model C therefore implies that expansion of rail lines in Africa will advance the economic competitiveness of regions; and this is explained by 75% as shown by the R square value. Noteworthy, the political stability index in this model provides a positive and significant coefficient as opposed to the result obtained for the same in model A and B. This result suggests that with an increase in the index which translates to reduced conflict, government disorder, violent demonstrations, social unrest, terrorism and tension the better chance there is for African countries or regional blocs to increase their FDI activity. It follows that the results of this analysis could only be obtained from 18 African countries out of the actual 38 countries under study. The inadequacy of the data is presumed to have had the greatest influence on this outcome.

IV. Air Transport Infrastructure Integration between the regional blocs and FDI

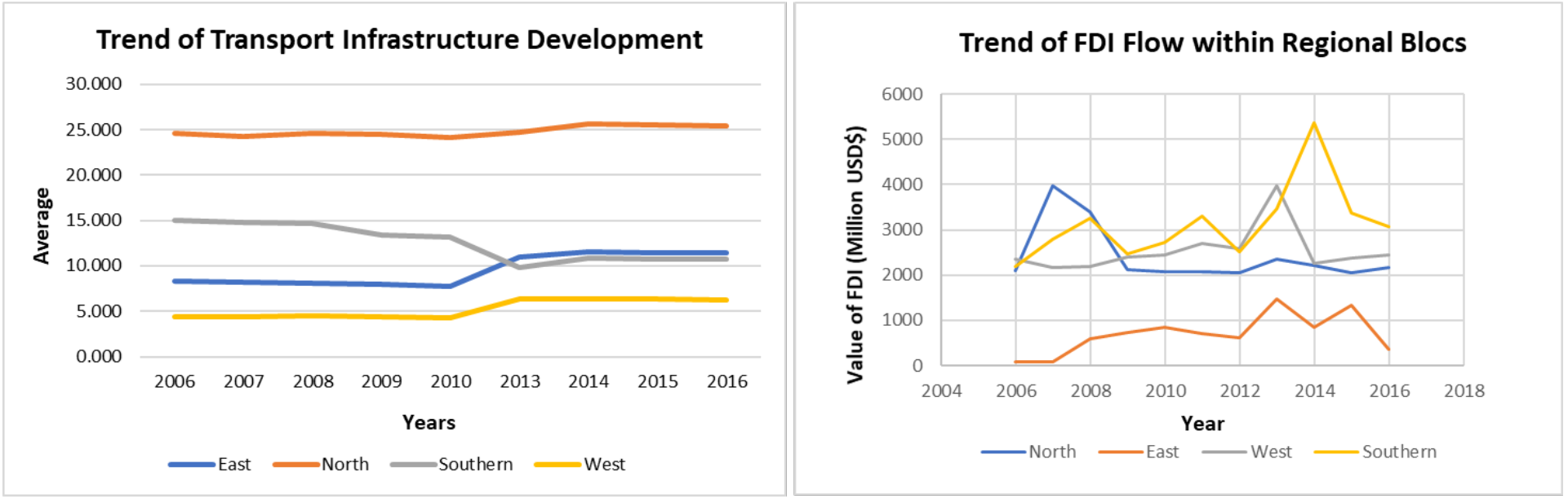
Model D on table 13 above presents the statistical analysis results that explain the relationship between air transport infrastructure integration and FDI. From the table, it can be seen that of the three indicators selected to represent air transport in this study, only freight (volume of goods transported by air) had a positive and significant coefficient when there is an increase in

the land area and investments in air transport infrastructure. At the regional level per the analysis still, East Africa emerges as the region with the next best potential of becoming as connected as Northern bloc; followed closely by West and Southern Africa respectively. This model suggests that East Africa has made the most substantial investments and improvements within the continent to enhance air transport services within the region. Model D explains 42% of this relationship as shown by the R square value obtained from the analysis outcome of 32 African countries distributed in the four regional blocs understudy.

4.5 Existing gaps in regional transport infrastructure integration and FDI

In order to elaborate on how FDI flow is influenced by the gaps in transport infrastructure integration within the blocs, a graph showing the trend of transport development based on the Transport Composite Index of the Africa Infrastructure Development Index (AIDI) is prepared. Figure 30 below shows the graph of transport infrastructure development together with that of FDI network flow within the region blocs discussed earlier in figure 4 above.

Figure 30: Line charts showing the trend of transport infrastructure development and FDI



Source: Author 2017, based on transport composite index, AIDI and FDI markets data (2006 -2016)

The graph showing the trend of transport development based on the Transport Composite Index of the Africa Infrastructure Development Index (AIDI) and that of FDI flow over the years is prepared for comparison analysis (Figure 30). The transport composite index which is a component of the AIDI was developed by the AfDB to assist in monitoring and evaluating the level of transport development within Africa (AfDB, 2016). Hence, this index looks at the four modes of transport under study and makes illations based on their development over the entire period of study.

The trend of transport infrastructure development shows that all the four geographical blocs have maintained steady progress in transport development except for the Southern bloc's performance that deteriorated between the years 2008 and 2014.

The general transport development pattern in the Southern bloc may have been associated with fluctuations in the quality, extensiveness and condition of road; as well as the drop in port infrastructure quality and connectivity; and the downward trend in railway development in the region as shown in figures 13, 11, 8, 19 above respectively. Yet, the bloc when compared to the rest of the regions per each mode, performed better in port infrastructure connectivity, road and rail transport. Consequently, such performance can be associated to its overall best performance FDI flow on the continent as shown in figure 4.27.

In a similar way, transport infrastructure development for the Eastern bloc according to figure 30 shows a growth in the regions infrastructure between the years 2010 and 2014 suggesting that continuous development projects were under way. This investment into infrastructure development may have accounted for the sharp FDI growth experienced within the region in the year 2013. Specifically, as revealed in this study, the region is found to have expanded significantly its volume of freight transported by air as well as the condition, quality and extensiveness of road infrastructure. Inferring from this performance, it is indicative that road and air transport in the region contribute to a greater extent to the regional flow of FDI whilst the insufficient efforts made to improve port connectivity and the rail road sectors constrained the performance of regional flow in FDI.

West Africa on the other hand as shown in figure 30 presents a progressive trend in regional flow of FDI between 2007 and 2013 which is also supported by the stable progress of regional transport infrastructure development within the same period. Of the four modes of transport, port quality and connectivity of the region appears to be the most stable, well performing mode that almost matches up to the performance of the Northern bloc that has been used it this analysis as a benchmark. The lowest performing modes in West Africa presented in figure 25 and 19 above are air and rail infrastructure implying that any initiatives made in those two sectors could boost FDI performance in the region.

Lastly, from the transport infrastructure development graph in figure 30 North Africa displays the overall best performance among the four regions, with above-average performance compared to the other regions. The infrastructure development trend in the region shows a slight improvement between 2010 and 2014 that may have been attributed to the slight increase in freight transport performance from the bloc as shown in figure 25 above. Despite the region's relatively good performance in overall transport development, its road transport sector has seen a continuous decline since the year 2010 and 2014. This phenomenon could explain why FDI flow within the Northern bloc had remained comparatively low between the years 2009 and 2015.

Chapter 5: Conclusions and Recommendations

5.1 Introduction

This chapter presents the answers to the research questions that guided this study, while putting into perspective the conclusions and recommendations as regards transport infrastructure integration and economic competitiveness of regional geographical blocs in Africa.

5.2 Conclusions

The level of productivity of economies defined as the competitiveness of regions and countries has over the years been measured generally using the Global Competitiveness Index (GCI) developed by Professor Schwab in 1979. The measurement of competitiveness has largely been done using 12 defined socio-economic indicators; one of which is the extent of infrastructure a country or a region has. Several studies qualify infrastructure as comprising of either soft or hard facilities, systems and structures that form the foundation of an economy. Literature on the relationship between infrastructure and economic competitiveness emphasize on direct positive correlation between infrastructure development and attraction of FDI. While there exists a lot of studies on these relationships, research that focuses on transport infrastructure particularly for developing countries is inadequate. Nevertheless, transport systems have been recognised as critical elements that link together economic activities that enhance regional economic competitiveness. In this light, it is important to explore how transport infrastructure leads to economic competitiveness especially in the developing world where the potential to develop the transport sector is growing. Accordingly, this research sort to find out how regional transport infrastructure integration contributes to the Foreign Direct Investments (FDI) for economic competitiveness of regional geographical blocs in Africa.

The study entailed analysing how the four blocs under study compare in terms of road, rail, water and air transport, discovering to what extent infrastructure influences economic competitiveness measured using FDI and identifying gaps in transport infrastructure that may be improved on; to advance economic competitiveness of geographical blocs. In this study, a review of literature revealed that though there exists a positive relationship between transport infrastructure integration and economic competitiveness; there exists other factors as per the Global Competitiveness Indicators (Schwab, 2016) that account for the overall competitiveness of regions. In a similar way, there are certain enabling factors that facilitate the development of transport infrastructure at the regional level as shown in literature and also illustrated in the conceptual framework of this study.

Reflecting on the first sub-question, findings from this research show that the regional blocs in Africa exhibit different performances in the various modes of transport analysed in this study. With regard to water transport, the best performing regions are Southern and Northern Africa who rank as first and second respectively in bilateral shipping connectivity between its countries. It is noteworthy to mention that the performance of all the blocs in terms of port connectivity has been stable throughout the period under study until an unexpected drop in performance for all the blocs in the year 2016. Again, in the water transport sector, the Northern bloc recorded the highest volume of container port traffic followed closely by Southern Africa. Such performance is as found in this study is confirmed in (AfDB, 2010) in a related analysis in which North Africa is said to host the highest port infrastructure capacity in the continent with the South African region holding the next best.

On to road transport infrastructure, this research revealed that the Southern bloc retained the highest quality, extensiveness and condition of road infrastructure without any significant improvement over the years. The Eastern bloc however, has made tremendous improvements in this indicator compared to all other regions; reaching the feat of the Southern bloc between 2013 and 2015. Findings also show that the performance indicators for North and West Africa on the same have been plummeting since 2010; suggesting a decline in quality, condition and extensiveness of roads within these two blocs. Linking back to literature, the study also shows that efforts have been made to integrate the road network at the continental level through the development of the TAH, that pass through several geographical blocs consequently contributing to the extensiveness of the networks, whilst improving access to landlocked countries.

Comparison of railway infrastructure between the four geographical blocs showed that the Southern bloc contains the greatest network of rail lines with a peak of about 32,200 kilometres as 2008. Yet, the following years recorded a decrease in these number implying a disuse in the rail infrastructure; a situation which can be attributed to what (UNECA, 2007) identified as poor maintenance and management of existing rail tracks leading to the deterioration and eventual poor state of rail infrastructure in Africa. Again, the West African region performs poorly in rail development without any progressive investment into the sector as the regional rail network coverage has been shrinking since 2006 to date (2016).

Air transport infrastructure in Africa as revealed in this study, is mostly underdeveloped in the West African region where the volume of freight transported within the bloc had barely reached 130 million tonnes per kilometre throughout the period of study. On the contrary dramatic efforts in the same sector within the Eastern bloc, improved enormously by about 1000 million tons per kilometre within the same period under study; making the region the best performing bloc in air freight transport as at the year 2016. The bloc's success in this sector can be attributed to major institutional adjustments made especially with the involvement of the private sector, in the management and operation of different airports particularly in Kenya (United Nations Economic Commission for Africa, African Union, et al., 2010).

The second sub-question of this research that purposed to find out the extent to which regional transport infrastructure integration contributes to FDI in the geographical blocs in Africa, led to the conclusion that with ameliorated and extensive transport investments and developments, regional geographical blocs are likely to strengthen and enhance FDI flow. With regard to water transport the panel regression analysis results show a positive relationship between LSBCI and FDI; however, this is only realised when there is improved development and expansion of port infrastructure to facilitate more connectivity; as well as investment in fixed assets of an economy. At the regional level, the analysis further revealed that the West African region has the highest potential of growing its FDI as a result of expanding its water transport sector especially through port infrastructure development.

Unlike the water transport model where the relationship between port infrastructure investments and FDI is positive; for road transport per this analysis the same are not significant since the available indicator was not exclusive to road coverage in the continent but rather contained other components which might have contributed to insignificant results obtained. Instead, the positive coefficient of the indicator used in this analysis showed the positive relationship between the quality, condition and extensiveness of road infrastructure with FDI. The Eastern bloc presented the best potential of improving its FDI with enhanced road quality, condition and extensiveness. To complement this deficiency in the analysis, inferences from a close scrutiny of the TAH map suggests that there are greater efforts to link the Northern region to that of the South through the Tripoli-Windhoek (Cape town) TAH as well as the North, South and Western blocs than linking the Southern bloc to the Northern region through East

African countries (United Nations Economic Commission for Africa, African Union, et al., 2010). Development of a TAH along the coastline that stretches from the North Africa through East Africa to the South would supplement the Cairo-Gaborone (Cape town) TAH that connects the aforementioned blocs.

In addition, the analysis between rail infrastructure and FDI is positive and significant implying that expansion of rail lines in Africa can help boost the economic competitiveness of regions and countries in the continent. It must be mentioned that such relationship exists only when the political condition of the regions is stable with reduced conflict, government disorder, violent demonstrations, social unrest, terrorism and tension. Here, this study points out the Western bloc as the region with the highest potential to achieve FDI growth with an expansion in its railway infrastructure under a stable political environment.

Concerning air transport infrastructure and FDI, this study revealed that the volume of goods transported by air had a positive and significant coefficient when there is an increase in the land area and investments in air transport. In the same way, the regional analysis revealed that East Africa has the highest potential of increasing its FDI flow if its performance in the volume of air freight transported is as enhanced as that of North Africa. This analysis suggests that East Africa has made the most substantial investments and improvements within the continent to enhance air transport services.

Furthermore, the last sub-question sought to find out the existing gaps in transport infrastructure integration affect FDI flow in Africa. To answer this question, the general trend of transport infrastructure development was compared against FDI inward flow for the entire period between 2006 and 2016. Findings from this comparison confirmed literature on the poor performance of African regions in FDI attraction partly attributed to the inadequate transport infrastructure development on the continent. For instance, the North African region performed relatively poorly in terms of FDI between the years 2009 and 2015 possibly as a result of a continuous decline in its road transport sector observed from 2010 to 2014. This may have been attributed to the political instability that came after the “Arab Spring” in the year 2011 which Dalacoura (2012) indicated that influenced several economic sectors in the region. Consequently, the implementation of transport development policies could not have been realised under such economic turbulences hence a negative rippling effect on the economic competitiveness of the region. On a similar note, FDI development in West Africa was largely affected by the region’s insufficient performance in its air and rail transport sectors. As such, FDI flow in the region remained stable with little improvement throughout the study period until a surge in its accumulated port infrastructure investment accounted for a sharp rise in its FDI flow.

From the forgoing discussion, this study shows that strengthening the gaps in the weak performing modes by equally balancing the development of transport infrastructure within the regions; will consequently stabilise FDI performance in the blocs, and eventually enhance regional economic competitiveness. Likewise, as this research revealed the great potential of transport infrastructure that Africa has in terms of connectivity and integration, the continents probability of competing in the global economy is only undermined by the current inadequate enabling factors of regional transport infrastructure integration systems in place.

5.3 Recommendations

Findings from this research have revealed important and relevant information that contributes to the available knowledge about the influence of transport infrastructure integration on regional economic competitiveness for African countries. The analysis revealed the best and worst performing transport modes among those studied for African geographical blocs; and hence the following proposed recommendations are provided with the intention of advancing the overall economic competitiveness of the continent. To start with, as FDI has been acknowledged as the main indicator for competitiveness, countries should then seek to improve on measures and practices that lead to the growth in foreign direct investments. Investments in transport infrastructure development presents a plethora of advantages such as connecting regions which then leads to exchange of knowledge and ideas, enhanced trade and transfer of labour and technology; all of which advance productivity and enhance economic competitiveness. If geographical blocs improve on their investment capacity, continental integration is likely to occur.

The unequal and unbalanced pattern of transport infrastructure development within the blocs is in dire need of attention. This analysis revealed that a region such as West Africa has the next best potential in terms of water transport by virtue of its advanced regional port infrastructure connectivity that almost matches up to that of North Africa. Yet, the region performs unsatisfactorily in its rail and air transport sectors due to the uncoordinated air transport development and insufficient railway infrastructure networks throughout the region. Consequently, this lowers the FDI flow in the region despite the potential performance of the bloc's port transportation. It is therefore urged that all the regions should attempt to balance the development of the different transport modes, so as to supplement the best performing mode in the respective blocs. This would also entail, harmonising of rail gauges between the different countries as literature revealed this to be the main cause of low rail connections observed between the countries; and also, coordinating the management between air transport carriers, to promote integration and regional interconnectivity.

In the same way, enhancing the capacity of transport infrastructure operation and management is highly recommended. As revealed in literature, corruption and red tape procedures that stall trade activities, inflate transportation costs and eventually weaken FDI movement are the largest detriment to the African economy. These consequently are attributed to the high cost transport on the continent compared to other affluent economies in the world. Focus on alleviating these challenges should therefore be major priorities for policy makers and planners in an effort to encourage trade activities between regions and enhance economic competitiveness.

Moreover, the ongoing development of the Trans-African Highways has led to the improvement of FDI performance within the geographical blocs and the upward trend of the quality, extensiveness and condition of road infrastructure for all the blocs except the South African region. Despite the irrefutable efforts made within the continent to expand road network connectivity by the development of the TAH, there is still greater potential to develop the road sector at the continental scale. As discussed, a TAH developed along the coastline stretching from the Northern bloc to the Southern region through East Africa, presents numerous advantages to the continent. Top on the list would be enhancing integration between the three aforementioned blocs; reducing time consuming inland connectivity by road between countries such as Kenya and Tanzania; supplementing port, rail and air connectivity in North, East and Southern Africa; and complementing the Cairo-Gaborone (Cape town) TAH that connects those regions. For these reasons, bottlenecks surrounding this development such as political instability at the Horn of Africa, liberalisation of transport infrastructure development

policies, geographical terrain and insufficient investment in transport development could serve to benefit the African continent in this sector.

Furthermore, it is recommended that the inland water transport in the continent be developed to maximise its full potential and complementarity to all other available transport modes. In this way, the various navigable water ways could be optimised to the benefit of landlocked countries whilst closing the gaps between transport modes and easing connectivity between countries.

Lastly, the initial intention of analysing the extent to which the major national highways of African countries connect to the transnational highways or to other major roads of a bordering country; and connectivity of railroads linking to the closest railroad infrastructure of a border country using Space Syntax analysis was not made possible due to time constraints. This would have made it possible to analyse the degree of connectivity and integration by discovering which countries within a region are closer and more unified by means of transport infrastructure in Africa. Equally, the analysis would then lead to more informative policy recommendations that steer transport infrastructure development accordingly. This prospective area of research would complement this study and further initiatives to integrate Africa

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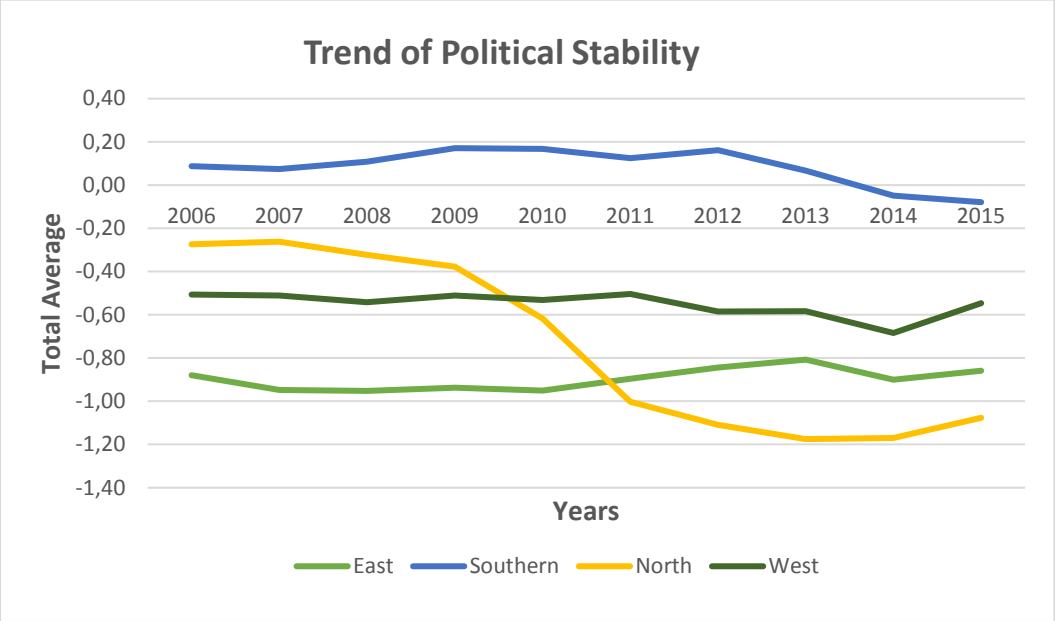
Annex 1: Regional Geographical Blocs in Africa

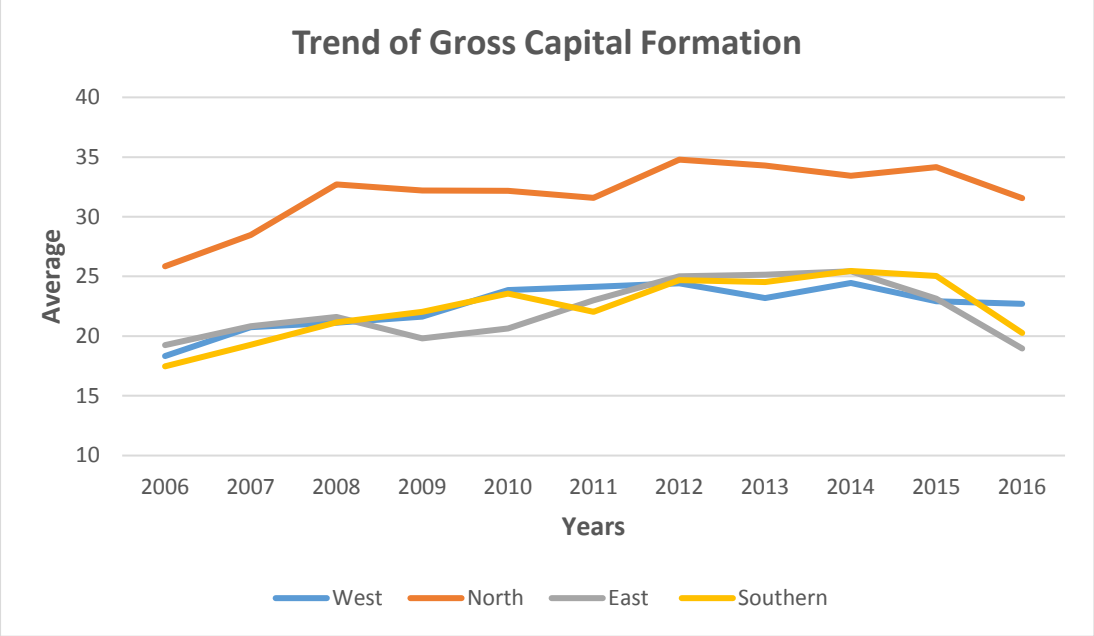
	Regional Geographical Blocs in Africa			
S/No.	**North**	**East**	**West**	**Southern**
1.	Algeria	Burundi	Benin	Angola
2.	Egypt	Comoros	Burkina Faso	Botswana
3.	Libya	Democratic Republic of Congo	Cameroon	Lesotho
4.	Mauritania	Djibouti	Cape Verde	Malawi
5.	Morocco	Eritrea	Central African Republic	Mozambique
6.	Tunisia	Ethiopia	Chad	Namibia
7.		Kenya	Congo Republic	South Africa
8.		Madagascar	Cote d'Ivoire	Swaziland
9.		Mauritius	Equatorial Guinea	Zambia
10.		Rwanda	Gabon	Zimbabwe
11.		Seychelles	Gambia	
12		Somalia	Ghana	
13		Sudan	Guinea	
14.		Tanzania	Guinea-Bissau	
15.		Uganda	Liberia	
16.			Mali	
17.			Niger	
18.			Nigeria	
19.			Sao Tome and Principe	
20.			Senegal	
21.			Sierra Leone	
22.			Togo	

Adopted from the United Nations Geographical Regions Classifications. Department of Economic and Social Affairs of the United Nations Secretariat (UN/DESA, 2014)

Annex 2: Line charts showing the trend of political stability and average GCF in Africa



Source: Author 2017 Based on the Global Economy 2006-2015



Source: Author 2017 Based on the WDI 2006-2016

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