Faculty Of Commerce, Law And Management(WBS)
MM - Finance and Investment, 2014

Infrastructure Deficit In The Economic Community Of West African States (ECOWAS): The Role Of Finance

A Research Report By:

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August 26, 2016

Abstract

This study seeks to identify and deepen the understanding of the root causes of infrastructure deficit with emphasis on the West African region. Amongst its objectives, the study explores tailored-approaches to infrastructure financing. The study takes direction from literature and similar work in the recent past and employs both conceptual and empirical - trend as well as cross correlation analysis - techniques in addressing its objectives. Literature points to Public-Private Partnerships (PPP) as the most suitable model for infrastructure finance provisioning which this study adopts. The study tests the significance of PPP and in so doing makes recommendations to policy-makers on key factors or barriers such as *political stability and the absence of violence*, *rule of law*, *regulatory quality*, etc. that require attention to enable the efficient use of PPP to mitigate the infrastructure gap within the Economic Community of West African States (ECOWAS) and the resulting consequences.

Acknowledgements

I would like to thank my supervisor, Prof. Kalu Ojah for his help during the initial phases of this research. His inputs on both the content of this document as well as background in the area have been of great help and are much appreciated.

My thanks also go to all my class mates, particularly to Bonaventure Mugimba and Sedjro Alovokpinhou, for being there to assist whenever I needed help with class materials or clarification of some notions with regard to this study. I would like to thank my family and friends, especially my Wife and Children, for their unconditional support and unwavering faith in my abilities. It is a blessing to be surrounded by such remarkable people.

Lastly and in loving memory of my late father, Mr. Eric Kobina Mensah, I am overly grateful to have had you for a father. Thank you and may your soul rest in peace.

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Chapter 1

Introduction

In a paper by Mafusire et al., (2010) on infrastructure deficit and opportunities in Africa, it is reported that opportunities for investment in Africa are huge, particularly in infrastructure which exudes potentially higher benefits. It is without doubt as evident in developed market economies[1] that the level of infrastructure development across all sectors[2] enables continued economic growth and sustainable development.

The Africa Infrastructure Review of 2013 prepared by Nedbank Capital of South Africa reports that the failure to provide modern, efficient infrastructure is considered to be the single, biggest obstacle to economic growth across Africa. It can be deduced that infrastructure plays a pivotal role in improving competitiveness, facilitating domestic and international trade, and enhancing the continent's integration into the global economy.

African countries continue to trail behind their developing countries counterparts by every measure of infrastructure development - be it, generation capacity, road density or service provisioning (AICD, 2010). To this effect, Africa continues to lose its position to its peers with the passing of time. Poor infrastructure leads to higher costs of attainment of and/or access to basic services. The levels of basic infrastructure availability vary widely between African nations. Peo and Botha (2013) report that, whiles in Nigeria for example, internet usage is running at 90% of the global average, it is a mere 12% in Mozambique.

The estimated financing requirement to close Africa's infrastructure deficit amounts to USD 90 billion annually starting from 2010 until 2020 (Mafusire et al., 2010; AICD, 2010). This amount threatens to inhibit the continent's economic growth. The solution, increasingly, has been to explore and turn to the private sector for support in the form of public-private partnerships (PPP) that can accelerate infrastructure development by tapping into the private pool of financial and technical resources available. The move in this regard is premised on insight that continued funding of infrastructure development by conventional sources alone would not

[1] As classified by data providers such as FTSE, MSCI, S&P and Dow Jones

[2] Air and seaports, electricity grids, telecommunication, roads and railways, power station, and water and sanitation

arrest the infrastructure deficit. Foster and Briceo-Garmendia (2010) present evidence to the extent that strategic investment in infrastructure has been beneficial to the countries that took the investments.

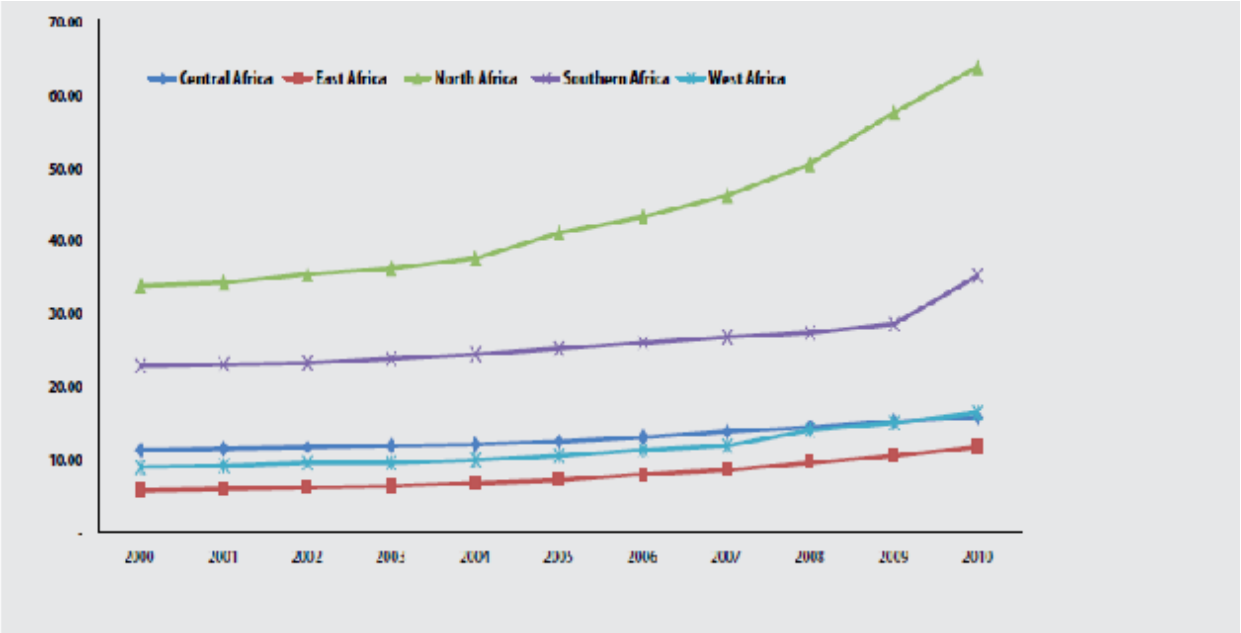

Figure 1.1: AIDI Sub-Regional Scores, 2000 - 2010.
Source: The African Infrastructure Development Index (2013)

The African Infrastructure Development Index (AIDI) developed by the African Development Bank (AfDB) provides consolidated, comparative and accurate information on the status and progress of infrastructure development in African countries primarily designed as a tool for analyst, policy-makers and investors alike. Figure 1.1 depicts a plot of *sub-regional* scores over the monitoring period, that is, 2000 - 2010. A notable and interesting observation is made in 2010 when Central Africa lost its place to West Africa - the region of interest of this study.

Africa by market segmentation belongs to the emerging (developing) market bucket. Furthermore, macroeconomic theory supports the assertion to the effect that gains on investments in emerging markets are high - all things remaining constant. In fact, investors that have gone into the telecommunications and finance subsectors, following improved regulatory conditions in Africa have realized higher returns compared to any other region in the world (Mafusire et al., 2010). UNCTAD reports that since 1990, the rate of return on foreign direct investment (FDI) in Africa has averaged 29%, and since 1991 it has been higher than in all other regions, in many years by a factor of two[3].

McKinsey & Company's economic study publication on *What's driving Africa's growth* reports that returns on foreign investments are higher in Africa than any other developing region[4].

[3]http://unctad.org/en/pages/DIAE/World%20Investment%20Report/WIR-Series.aspx
[4]http://www.mckinsey.com/insights/economic_studies/whats_driving_africas_growth

1.1 The research problem

Infrastructure deficit in Africa at large is relatively common knowledge. What is not common is the root factor(s) of the deficit in infrastructure in general, that is, in Africa and the West African economies as a focal point. The impeding characteristics[5] of institutions that promote fair, secure and transparent investment participation and / or transactions, namely *Governance Institutions* and *Legal Institutions / System* are at the root of Africa's infrastructure deficit. These factors are expanded below.

1.1.1 Governance Institutions

Owoye and Bissessar (2013)[6] argue and present empirical evidence to the effect that corruption persists in African countries because of bad governance perpetrated by their dictatorial leaders who prefer to govern where institutional checks and balances are weak and do not exist. The authors also find that institutional structures in Africa are weak regardless of whether leadership changes are frequent or infrequent and that over the past four decades, corruption has worsened considerably as many countries transitioned into corrupt states.

The empirical results of the study by Owoye and Bissessar confirm not only the weakness of these institutions in controlling corruption but also the lingering effects of institutionalized corruption in many African countries and therefore places Africa in bad light as a haven for investment and financial development amidst the reported high investment gains it presents as an investment region.

1.1.2 Legal Institutions / System

Legal systems are perceived to be largely ineffective in the African context. A study conducted in 2013 by the AfDB titled Initiative for Risk Mitigation, lists *ineffective legal systems* amongst its eleven types of risk which domestic and foreign investors in Africa are exposed to. A survey conducted across a multitude of target participants spanning Host Governments, Development Finance Institutions and / or Export Credit Agencies, Private Sector Investors, Private Sector Providers of Risk Mitigation and other Private Sector & NGOs provides insight on the degree to which ineffectiveness of the legal system in Africa is appreciated and considered an impediment to infrastructure provisioning. This risk scores the highest (average) at 83% with respect to significant demand for mitigation of risk type by the survey participants.

[5] In relation to developed market economies, that is, the Americas, Europe and Middle East and the Pacific

[6] The article is unpublished. Authors however draw references to academic papers published as recent as 2012.

The noted factor(s) promote the continued deficit in infrastructure in Africa and the Western African region (if not properly appreciated and acted on). The continued deficit has short to long-term detrimental consequences on Africa. These are as follows:

(i) An impediment to the region's progress towards improved living standards.

(ii) Creates deepened levels of poverty.

(iii) Hinders domestic and international trade as well as investments.

(iv) A regressing / stagnant economy which disintegrates Africa from the global economy.

This set of consequences driven primarily by infrastructure deficit is the problem that my research will help resolve.

1.2 The purpose of the study

There is material information that infrastructure is strongly and significantly correlated with growth[7]. Easterly and Levine (1997) have affirmed this view in the African context. A generally accepted notion in finance and economics is that finance leads growth regardless of the level of development of an economy. In Africa's case, the World Economic Forum's Global Competitiveness Index 2012-2013 confirms that Africa is the least competitive global region despite robust economic growth rates of over 5% per annum over the past three years. Inadequate infrastructure is cited as the third most serious constraint after access to finance and corruption, thus a demonstration of the close linkage between infrastructure and the region's competitiveness.

It is without doubt therefore that the impediment(s) to infrastructure funding in Africa are in the way of Africa's growth potential. In light of aforementioned, the study is therefore designed to identify these root cause(s), sensibly, theoretically contextualize other problems (that are not known) and explore *tailored - approach(es)* to infrastructure financing amidst the challenges facing Africa as a whole and the region of interest viz: West Africa with the view to accelerate the mitigation of infrastructure deficit and thus promptly address the adverse consequences noted.

1.3 The objectives of the study

West Africa in the wake of a relatively stable political climate and abundance of mineral reserves, notwithstanding the recent discovery of oil fields in Ghana, the second largest economy in ECOWAS presents exciting times for investments, economic activity and growth. However,

[7]AIDI (2013) pp 1 cites academic work by Canning and Pedroni (2008) and Egert, Kozluk and Sutherland (2009) in support of this statement

infrastructure inadequacy inhibits to some degree investor participation in this potentially attractive sub-regional market.

The specific objectives of this study are therefore as follows:

(i) To identify and deepen the understanding of the root cause(s) of infrastructure deficit in Africa, particularly the ECOWAS sub-region.

- To fully appreciate the level of infrastructure development and the consequences of the continued infrastructure deficit

(ii) To explore *tailored-approach(es)* to infrastructure financing

(iii) Make recommendations on how an ECOWAS-focused finance model could accelerate the mitigation of infrastructure deficit and resulting consequences / drawbacks.

1.4 Study Overview

The study is organized as follows:

(i) Following this introductory chapter is the literature review chapter, which gives an overview of the relevant literature with regard to the study objectives.

- The narrative captures amongst other the status quo of infrastructure in Africa, reports on current trends in infrastructure with emphasis on West Africa, explores infrastructure financing models in emerging markets economies, narrows the focus on infrastructure financing to Africa, and lastly provides a glance on the governance agenda.

(ii) A methodology chapter which seeks to provide insight on the methods or techniques applied in addressing the study objectives lags the literature review chapter.

(iii) The study progresses to unpack its findings premised on the analysis of input data (variables) using the techniques alluded to.

(iv) Lastly and in an effort to sump up the study's objectives, it draws to a conclusion and makes recommendations to policy-makers in West Africa.

Chapter 2

Literature Review

2.1 Infrastructure - An African overview

From a review of some of the African Infrastructure Country Diagnostic (AICD) reports - a project collecting data on the current state of infrastructure sectors in Africa - the following trends were found:

(a) Infrastructure contributed over half of Africa's improved growth performance (i.e. in the last decade or so). For example, across Africa, infrastructure contributed 99 basis points to per capita economic growth from 1990 to 2005, compared with 68 basis points from other structural policies (Foster & Garmendia, 2010, p.2–13).

(b) It is reported that other developing regions' infrastructure leads Africa's. This relationship is more evident in low- and middle-income countries in Sub-Saharan Africa. Examples: for paved roads, the numbers are 31 against 134 respectively; while for telephone main lines, they are 10 against 78 respectively; for power generation, they are 37 against 326 respectively, etc (Foster & Garmendia, 2010, p.2–13).

(c) The economic landscape of the continent, viz: Africa, is considered an obstacle towards development of infrastructure. Examples: Africa's inherent low population density i.e. 36 people per square kilometer, low rates of urbanization (35%), 27% of the countries in Africa are landlocked, and a considerable amount of small economies ($ 10 billion on average) (Foster & Garmendia, 2010, p.2–13).

(d) The cost of infrastructure services in Africa is reported to be two-fold compared to other regions - notwithstanding Africa's poor delivery of the said services. Examples: power tariffs in Sub-Saharan Africa (SSA) are 0.02-0.46 $ per kilowatt-hr against 0.05-0.10 $ per kilowatt-hr in other developing regions (ODR); water tariffs in Sub-Saharan Africa are 0.86-6.56 $ per cubic meter against 0.03-0.60 $ per cubic meter in ODR; internet dial-up service in SSA is 6.70-148.00 $ per month against 11.00 $ per month in ODR (Foster & Garmendia, 2010, p.2–13).

(e) Compared to the developing world, Africa's power infrastructure outputs a fraction of the service found elsewhere - be it by a measure of generation capacity, security of supply or electricity consumption. To put it into perspective, the 48 sub-Saharan Africa countries (i.e. for a total of 800 million people) generate roughly the same power as Spain (a country

with 45 million people) (Foster & Garmendia, 2010, p.2–13).

(f) Africa's infrastructure spending needs at $ 93 billion a year are more than double previous estimates by the commission for Africa. Of which some two-thirds of this total relates to capital expenditure, and the remaining one-third to operation and maintenance. For example, the following figures are reported to substantiate and demonstrate the skew weighting in capital expenditure (CAPEX) and operation and maintenance (O&M) spend, in $ billions annually: for power - 26.7 in CAPEX and 14.1 in O&M for a total of 40.8 is needed; while for transport - 8.8 in CAPEX and 9.4 in O&M for a total of 18.2 is needed; water supply and sanitation 14.9 in CAPEX and 7.0 in O&M for a total of 21.9 is needed; etc (Foster & Garmendia, 2010, p.2–13).

(g) Infrastructure development in the region is largely country-specific. Examples: Cape Verde and South Africa are considered middle-income countries, Ivory Cost and DR-Congo are considered fragile states emerging from conflict, whilst Zambia and Nigeria are considered resource-rich countries with economies heavily reliant on petroleum or mineral revenues, etc. however, the level of infrastructure development varies for each category. These circumstances help in analyzing the development of infrastructure in the region (Foster & Garmendia, 2010, p.2–13).

(h) It is reported that domestic financing comprises a larger portion of Africa's infrastructure development. Spending on infrastructure amounts to $ 45 billion a year cumulatively. Africa's taxpayers and users of infrastructure contribute up to two-third of this spending. The remaining one-third contribution is externally sourced (Foster & Garmendia, 2010, p.2–13).

(i) $ 31 billion a year is Africa's funding gap. This amount is considered net after potential efficiency gains and is largely in the power sector. Examples of these inefficiencies are; overspending estimated at $ 3.3 billion yearly; bad execution estimated at 1.9 billion yearly; cost of late rehabilitation against preventive maintenance; distribution losses, undercollection of revenues, and overstaffing in Africa's power and water utilities; substantial underpricing of infrastructure services (Foster & Garmendia, 2010, p.2–13).

(j) Institutional, regulatory, and administrative reform process in Africa are only halfway along. At the continent level, concerted efforts toward institutional reform infrastructure have been made. However, only few countries have a modern institutional framework for these infrastructure sectors. Overall, the greatest progress has been made in telecommunications, whereas transport lags furthest behind. The focus also varies. For example, in telecommunications, the emphasis has been on implementing sector reform, in water, the focus has been on improving the governance of state-owned enterprises. As for the private sector, its participation varies across the sectors. It has proved willing to invest only in mobile telephones, power plants, and container terminals. While in power, water, and railways, it has only delivered improvements in operational performance but no new finance (Foster & Garmendia, 2010, p.2–13).

2.2 Current Trends in Infrastructure - West Africa

The Economic Community of West African States (ECOWAS) comprises 15 countries. This sub-region attained a 6% growth rate over the past decade and is relatively at the forefront of growth on the continent. For this reason, this sub-region is becoming home to foreign direct investment across all economic sectors. This enabling environment is premised on 300 million in population growth, abundance of mineral and natural resources, etc. (Cawood, 2014, p.66).

Notwithstanding the region's recent positive economic growth outlook, its chronic infrastructure deficit remains a huge handicap for a faster, speedy, and inclusive economic development in the region. There is a considerable number of infrastructure activities currently underway across sectors such as energy - power generation in particular; transport - roads, rails, ports, air; water supply and sanitation; etc. These activities in the region span the physical rehabilitation and/or construction of assets as well as reforms in the policy and regulatory environment. On the funding front, public-private partnerships (PPPs) is proving to be the preferred procurement model for financing large mega infrastructure projects. To this effect, Chinese investments are also playing a significant role. The US$ 2 billion six-lane dual carriageway connecting Lagos and Abidjan via Cotonou, Lome and Accra; the awarding of the US$ 1.49 billion contract to China Civil Engineering Construction Corporation (CCECC) to build the Lagos - Ibadan railway, the pledge by China to support the Nsawam-Kumasi-Paga railway project in Ghana to the value of US$ 6 billion; the announcement of a new US$ 200 million international airport by the Sierra-Leone government backed by China Railway International Company with financing from China's Export-Import bank; etc. are but few examples of PPPs dominance as a finance model in the sub-region (Cawood, 2014, p.66–71).

2.3 Emerging Markets Infrastructure - Trends in Financing Models

Infrastructure development in emerging markets has largely been driven by renewed enthusiasm which has propelled *new capital* into these economies. Apart from traditional western multilateral agencies (which we expand on later in the section) and public-private partnerships (PPPs) which are viewed by the private sector as inconsistent because they can be, in some cases, constrained by politics (Orr & Kennedy, 2008). Examples of sources of this *new capital* are as follows:

(i) *Dual firms* - these are quasi-government, quasi-private firms. They have grown out of stalled reform processes and own and operate infrastructure (Woodhouse, 2005).

(ii) *South-South investors* - these are investors in infrastructure within developing countries who are investing in local and regional projects. Financing in local currency has been propelled as a result of such activities (Yanosek et al., 2007).

(iii) The *rise of BRIC (Brazil, Russia, India, and China) country export-import banks* - increased activities by public financial intermediaries located in these countries (Caspary, 2007).

(iv) The *rise of petrodollars and private infrastructure investment funds* - for the former, this has been driven by imbalances of supply-demand which has led national oil companies and sovereign wealth funds from counties such as Qatar, U.A.E, Saudi Arabia, etc. - to take up investments in energy infrastructure and ancillary infrastructure along the extraction supply chain; for the later, its rise is informed by low interest rates and robust capital market activity (Orr & Kennedy, 2008).

Kingombde (2011) provides a general view on Africa's infrastructure and also presents the current financing institutions around the globe. They range, on one hand, from development finance institutions such as the German and Dutch Bi-lateral whose main objective is to invest in enterprises that contribute to development. The International Finance Corporation (IFC) followed by the European Bank for Reconstruction and Development (EBRD) were the most recent and impactful in terms of development finance providers. We also have the International Development Association (IDA). It is a public sector institution that specializes in lending to developing countries. Private Equity and Investment Banks on the other hand are becoming major shareholders in companies that invest in infrastructure. Among the investment Banks are Goldman Sachs, Standards Chartered Bank, Barclays Bank and Nomura Holdings Inc. in addition to the banks are Sovereign Wealth Funds that play significant role in providing assistance to infrastructure development.

Anglade and Garbrah (2012) explain how a diaspora bond can help in building additional funding sources for infrastructure projects in Africa. The authors argue that, in the absence of foreign funding opportunities, authorities can still provide funding sources for infrastructure projects only by focusing on the domestic markets' potentials. In that sense, a diaspora bond should be the focus for patron institutions such as the African Development Bank (AfDB) and support from private domestic institutions. If this is well handled, it can provide the greatest impact in terms of finance opportunities for infrastructure. As referenced examples, diaspora bond has provided successful means of finance to countries such as India, Israel and Ethiopia. They further add remittances as another means of finance that the African development bank could tap into.

On the other hand, the study by Farlam (2005) on the assessment of Public-Private Partnership in Africa reports that, PPP is a model in development finance that allows government to mitigate the risk associated with one side infrastructure investment. The model creates efficiency in the public business sector and eliminates the political aspect associated with privatization of public enterprises. The PPP model permits government to maintain public ownership status whilst allowing private sector to perform designated functions such as building, maintenance and also be allowed in the provision of water and electricity. Even though the private sector may not be efficient in providing appropriate pricing model, the government is allowed to regulate the pricing behavior.

Ncube (2010) investigates infrastructure management and the financing opportunities in Africa. He also argues that there are many reasons why the Public-Private partnership *should* be used by government to produce adequate infrastructure. Some of these reasons are: (i) PPP helps accelerate the implementation of prioritized projects by doing things in new ways, (ii) allows the private sector to efficiently manage projects that are large and complex, (iii) PPP allows private sector to introduce new technology and use its own expertise to accelerate and

organize potential financing sources in the private sector, (iv) PPP implementation encourages private entrepreneurship and ownership in the sector, (v) PPP enables the reduction of the size of public institutions and by replacing public institutions' personnel with private personnel. Ncube argues that, the PPP enables the identification of the best contracts with the private sector thereby leading the public sector to obtain appropriate and desired results.

Outside of PPP and other approaches alluded to earlier by this study, local government and communities based models are used to provide and finance infrastructure in developing countries. Project finance is yet another alternative to infrastructure finance. Esty (2003) presents the goodness of project finance as a new model that can be used by private as well public enterprises to finance projects. The use of project finance has sizable advantages that should not be ignored. This financing method provides ways to solve agency conflicts through the use of joint ownership and leveraging. It allows managers to reduce the opportunity cost of under investment. The method is also used to resolve the problem of investment distortion and the distress caused by incremental cost.

In an effort to continue to deepen the understanding and explore tailored-approaches to infrastructure financing, this study makes reference to Estache (2010), who reports on the limits to which private-sector participation in infrastructure financing can be employed to achieve growth notwithstanding broader social objectives. The author suggests that infrastructure financing by public-sector is grossly underestimated in provision of services to the poorest.

2.4 Infrastructure Financing - An African Perspective

2.4.1 Overview

The importance of infrastructure development and access to related services is a world wide recognized issue. And nowhere is the lack of infrastructure more crucial and potentially transformational than in sub-Saharan Africa in particular, and in Africa as a whole. An investigation into the region's glaring infrastructure gap estimated that the continent needed to spend $ 93 billion per year to fill this gap; however, recent figures show that macroeconomic policies in terms of infrastructure promotion have had significant effect on infrastructure development particularly in the West Africa sub-region.

Since then, the response in tackling the infrastructure gap has been unprecedented. Particularly, its main sources of financing have both evolved and increased at the same time. Overall three major sources of external financing have emerged. They are : (i) private participation in infrastructure (PPI) investments; (ii) official development finance (ODF) from multilateral institutions and most of the OECD-DAC donors; and (iii) official Chinese financing (Gutman, Sy, & Chattopadhyay, 2015).

Further, this surge in financing in Africa has tripled between 2004 and 2012 across all three external sources. This period has also seen the dominance of ODF institutions such as the World Bank and the African Development Bank in infrastructure financing decline as private investments surged to over 50% of external financing; and China became a major bilateral

source; even though its overall level increased.

This increase in funding has benefited more or less all sub-Saharan African countries with the exception of a limited number of fragile states facing serious governance issues. In absolute terms, these external funds are concentrated in the five large economies - i.e. South Africa, Nigeria, Ghana, Kenya, and Ethiopia - although their order varies slightly depending on the financing source. From a sectoral point of view, preference and criteria of the various external sources dictate the distribution of these funds. For example: the energy sector attracts 45% of total external finance and is concentrated; while private investment has historically favored the telecommunications sector; official Chinese investments are now expanding to sectors such as hydropower and transport (road and rail); lastly ODF is the only external source financing water and sanitation projects (Gutman et al., 2015; Mensah, 2010).

However, despite this rise in importance of the external financing sources, the primary source of funding for infrastructure in sub-Saharan Africa continues to be public sector budgets. The IMF estimates that sub-Saharan African countries finance about 65% of their infrastructure expenditures - i.e. almost $ 60 billion; that is about 4% of sub-Saharan Africa's GDP - from their public sector budgets (this amount excludes financing from multilateral institutions). In absolute terms, South Africa dominates these expenditures with about $ 29 billion (in 2012), with Kenya, the next country, only allocating about $ 3 billion (Gutman et al., 2015).

2.4.2 Problems associated with Africa's infrastructure financing

The study by Choguill (1996) argues that, providing adequate infrastructure in urban areas helps promote sustainable development in those areas. Ranging from physical to social infrastructure, the models used to avail infrastructure to the public are attributed to local government and communities. His study goes further to suggest the Philippine's community mortgage program as a reference model that other developing countries can follow. Easterly and Levine (1997) assess Africa's growth tragedy using empirical evidence. They report that, low level of school attainment; inadequate financial systems, large deficit and lack of infrastructure are significant and impact the economic growth.

As detailed by Jones and deLima (2004), various reasons underlie the unattractiveness of foreign capital as a potential source of finance for Africa's infrastructure projects. They posit that the revenues generated by projects are denominated in local currency. The difficulty to eliminate the nature and level of risk associated with local currencies is a deterrent to investments. Adding to that, investors' contracts are not protected and the business environment is characterized by weak enforcement of contracts and investors' rights. The absence of diversification opportunities does not allow investors to reduce the risk associated with the equity holding in infrastructure projects. These are followed by the highly concentrated risk in most developing countries such as Africa's.

The same authors outline the risks that an investment in infrastructure projects is exposed to. They point out that, infrastructure projects markets in Africa are not cost efficient. The costs (both capital and operating) of financing infrastructure projects constitute a bigger pro-

portion in the total financing budget. The lack of expertise creates long period of construction and this in turn has negative impact on the revenue that the project can generate.

2.5 A Glance At The Governance Agenda

Recent focus on the governance of transactions/projects has led to efforts to support project preparation funding and promote public procurement reform to foster new forms of financing such as PPPs. One key problem, however, with this perspective, has been that of monitoring the quality of contract/project implementation. This is particularly important, because, whether due to construction uncertainties or corruption, failures during implementation have substantial impact on the quality of outcomes(Gutman et al., 2015).

Further, Foster and Garmendia (2010) recommend that an increased attention to sectoral governance issues and overcoming inefficiencies through, *inter alia*, better maintenance of existing infrastructure, institutional reform of utilities and service providers, administrative and regulatory reform, and improved subsidy policies and practices. Additionally, the paper estimates that addressing these issues could save up to $ 17 billion of the estimated $ 93 billion required per year to fill the infrastructure gap in sub-Saharan Africa.

Lastly, in the changing context of Africa's sources of infrastructure financing (i.e. widening range of public finance options involving both traditional and non-traditional sources), the current institutional governance structures such as the African Development Bank on aid flows, globally and regionally, will have to adapt if they are to remain relevant both in terms of their purpose and role relative to the new institutions such as the BRICS' New Development Bank, the China-led Africa Growing Together Fund (AGTF) (Gutman et al., 2015).

Chapter 3

Methodology, Data and Results

3.1 Methodology

This study utilizes trend descriptive statistics, trend analysis and cross correlation between a number of variables to assess the *significance* and *effectiveness* of Public-Private Partnerships in contributing to infrastructure development in West Africa. We first present trend analysis, showing how infrastructure indices in the West African countries have been performing in each country and the region as a whole. Following Kasri and Wibowo (2015), we explore in detail, the potential factors that influence the level of foreign direct investment (FDI) in West African countries, using cross correlation analysis.

3.1.1 Variables

Infrastructure indices, Gross Domestic Product per capita, the real effective exchange rate, foreign direct investment, institutional factors and political factors are the variables used in this study. Other studies have provided an empirical investigation on cross country determinants of PPP at industry level. They find that PPP is frequent in large market countries with a considerable level of public debt with a significant weakness in macroeconomics condition, (Hammami et al , 2006). The present study utilizes the same economic variables as Hammami et al (2006) and Kasri and Wibowo (2015) to investigate the significance and effectiveness of PPP in west Africa.

3.1.2 Data

The data employed in both descriptive as well as cross correlation analysis is obtained from the World Bank under the Private Participation in Infrastructure (PPI) database. Data on institutional and political factors is sourced from the World Bank Governance Indicators database whilst the data on infrastructure indices is sourced from the African Development Bank (AfDB). The World Development Indicators is home to data on the gross domestic product per capita and the real effective exchange rate.

3.2 Results

3.2.1 Importance of PPP

Literature has provided insight on the status of Africa's infrastructure gap and infrastructure financing models. Evidently, varying models of finance have been used to provide support in Sub-Saharan Africa. Among the models used for financing the infrastructure gap are *government own spending*, *public-private partnership* (PPP), *diaspora bond*. The specific objectives of this study are to present the current status quo of infrastructure in West Africa and explore tailored-approaches to infrastructure financing in the region. Having a better understanding of factors that are crucial and influence the models of finance will allow us to select and recommend appropriate strategies.

As argued by Ncube (2010), PPP is an accelerator and helps in the implementation of prioritized projects in different ways that benefit both private and public parties involved in the partnership. Recent work has provided empirical support to the public-private partnership model. For example, Araya et al (2013) investigated how country's risk affects the PPP model. They reveal that, countries that are newly coming out of political conflicts need 6 years to be able attract investments in the form of PPP. In addition, they report that private participation is mostly needed in sectors such as water, power provision and roads.

We have researched extensively and point to related studies that focus on using econometric model to provide applicable model of finance in closing the infrastructure gap in Africa. Kumo (2012) conducted a study, his focus however, is on the causal relationship between infrastructure investment and economic growth. The results suggest a strong bidirectional relationship between economic growth and infrastructure investment. He also argues that, infrastructure development is a source of employment.

Ranging from government spending to public-private partnership, the public-private partnership model has been suggested as the ideal vehicle to infrastructure financing by most authors of similar work. Beside what is proposed in the literature as an efficient method of financing infrastructure, the current study employs trend as well as cross-correlation analysis to investigate the factors that significantly influence private funding. Araya et al. (2013) further provides empirical analysis on the intensity of private participation in African countries. They use variables such GDP growth, inflation and openness. They realize that, country's risk is one of the factors that determines whether infrastructure's investments attract private capital. An overall conclusion of their study reveals that, country's risk is an influential factor to the collaboration between public and private parties.

Public-Private Partnership has been studied in Poland. The study shows that, the overall macroeconomic condition, legal system and poor public institution are factors that impede the well-functioning of PPP (Zagozdzon, 2013). Market condition and institutional quality are other factors.

3.2.2 Descriptive analysis, Infrastructure gap and Economic Outlook

The first part of the empirical analysis presents different trending analysis using the African Infrastructure index constructed by the African Development Bank (AfDB). Four sectors of infrastructure viz: transportation; energy; water and sanitation; and telecommunication comprised the original selection. Due to frequent discontinuation in the data, we then decided to narrow our focus to the telecommunication sector. Foreign Direct investment is used as a proxy for foreign private participation in the Infrastructure development in the region.

Infrastructure development

The trend of infrastructure development is explored premised on data from the African Development Bank (AfDB) infrastructure data. This trend is then compared to other African countries in the West African region. Figure 3.1 below shows the trend of the index for select-African countries in the region. The figures show an improvement in the infrastructure index for most West African countries over the period which data was collected and interpreted - viz: 2000-2010.

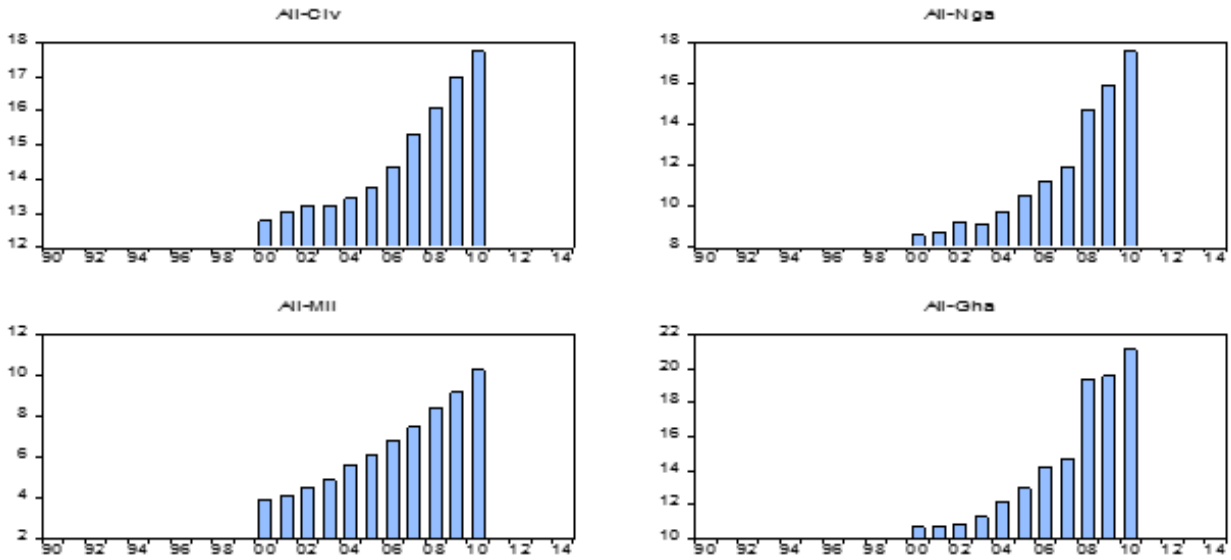

Figure 3.1: African Infrastructure Development Index
Source: Own computation using AfDB data

The countries included are Cote d'ivoire, Nigeria, Mali and Ghana. The evolution of private sector in infrastructure development is illustrated by Figure A.1, Appendix A. Emphasis is placed on the telecommunication sector due to the discontinuation of the data in other sectors. Private participation in the telecommunication sector was heightened in the period 2006-2010 as most countries experienced an increase in the provision of telecommunication. Post 2010, there has been a decrease in the provision and participation of private investors in the provision of telecommunication.

Recent studies have used econometric models to exploit the relationship between infras-

tructure investment and the role of FDI. The data employed is available for selected number of years in the region of interest of the study. For example, Kirkpatrick et al (2006) investigate how FDI is impacted by political and regulation issues in developing countries. They find FDI to positively respond to effective and well handled political issues.

Foreign Direct Investment and GDP per capita in West Africa

This analysis utilizes data on foreign direct investment to illustrate the inflow of foreign capital in the West African region. Table 3.1 below presents five years average growth rate on the foreign direct investment as a percentage of GDP per capita for each country in the region over a 25 year period.

Table 3.1: Five years average FDI as percentage of GDP from 1990-2014

Benin	**B-Faso**	**C-d'Ivoire**	**C-Verde**	**Ghana**	**Guinea**	**Gambia**	**years**
2.95	0.26	0.05	0.40	1.46	0.53	1.89	90-94
1.49	0.96	1.93	6.55	4.37	3.31	5.45	95-99
1.56	1.16	1.69	7.12	5.16	4.18	6.60	00-04
0.46	0.68	1.95	10.41	5.74	5.34	8.69	05-09
2.84	2.30	1.30	6.49	7.88	5.92	3.94	10-14
G-Bissau	**Mali**	**Niger**	**Nigeria**	**Senegal**	**S-Leone**	**Togo**	**years**
1.16	0.09	0.37	5.39	0.59	0.77	0.27	90-94
1.50	3.22	4.42	2.99	1.94	5.88	3.87	95-99
1.52	3.73	5.77	2.74	1.99	7.76	4.55	00-04
2.05	3.70	4.36	4.08	2.82	3.95	2.84	05-09
2.05	3.51	12.32	1.44	2.13	16.78	7.48	10-14

Source: Own computation using World Bank data[1]

In the period 1990-1994, Benin Gambia and Nigeria receive respectively 2.95%, 1.89% and 5.95% of FDI inflow as percentage of GDP. The following five years saw an increase in FDI for Cape Verde, Gambia and Sierra-Leone. Cape Verde, in the period 1995-1999 received 6.55%, Sierra-Leone received 5.88% and Gambia's inflow of FDI increased by 3.56% as compared to the period 1990-1994. In the period 2000-2004, Cape Verde, Sierra Leon and Gambia were still among the top three receivers of FDI.

After 2005 and up to 2009, Ghana, Cape Verde and Gambia were the top three and in the recent past five years, that is from 2010 to 2014, Sierra-Leon Ghana and Niger received much more of foreign direct investment than all the other West African countries. These figures indicate that, Gambia, Cape-Verde and Sierra-Leone, for the past twenty-five years have been

[1] Although not reflected in Table 3.1, Liberia was considered in the study and its FDI follows the general trend in the region.

investment destination in terms of foreign direct investment in West Africa in the past twenty-five years.

Premised on the aforementioned findings, the study also explores the level to which FDI-led infrastructure promote standard of living (GDP per capita) in West Africa. In doing so, the study presents growth rate of Gross Domestic Product per Capita in the past twenty years for the selected countries. Table 3.2 below presents the growth rate of GDP per Capita in the above countries. Even though, Cape-Verde, Gambia and Sierra-Leone have received an important level of FDI in the past, Nigeria has experienced a consistent increase in the GDP per capita for the past twenty-five years. Furthermore, Sierra-Leone, Cape-Verde and Ghana have seen a significant increase in the living standard of the population. In the first Five years after 1990, Gambia's average GDP per capita was 27% and consistently drops to -22% in the last Five years, up to 2014.

Table 3.2: Five years average growth rate of GDP per capita

Benin	**B-Faso**	**C-d'Ivoire**	**C-Verde**	**Ghana**	**Guinea**	**Gambia**	**years**
-6%	-13%	-9%	6%	-4%	1%	27%	90-94
8%	7%	6%	5%	5%	-2%	-1%	95-99
8%	8%	5%	8%	3%	0%	-9%	00-04
6%	9%	6%	13%	24%	4%	6%	05-09
3%	5%	5%	1%	7%	5%	-22%	10-14
G-Bissau	**Mali**	**Niger**	**Nigeria**	**Senegal**	**S-Leone**	**Togo**	**years**
-3%	-8%	-13%	-11%	-11%	10%	-13%	90-94
-2%	5%	2%	14%	4%	-6%	8%	95-99
18%	9%	5%	18%	7%	14%	2%	00-04
7%	9%	8%	13%	7%	8%	8%	05-09
3%	3%	4%	29%	1%	13%	5%	10-14

Source: Own computation using World Bank data

Nigeria and Ghana have grown rapidly noting that the average standard of living for Nigeria in the recent five years is 29% as compared to its average standard of living of -11% in the period 1990-1994. The Average GDP per capita for Ghana in the early 90s is -4% as compared to 24% in the period 2005-2009 and 7% for the period 2010-2014. The figures presented above depict a broad view on foreign investment and the economic prospect for the past twenty-five years thus enabling the study to address its specific objectives - viz: exploring tailored-approaches (finance models) to infrastructure financing in West Africa.

3.2.3 Cross Correlation analysis

Some researchers have argued about the relationship between infrastructure development and economic growth. We use a cross-correlation between the African infrastructure indices provided by the African Development Bank to explore the relationship between the two variables. Tables 3.3 and 3.4 present the cross-correlation coefficients, illustrating the relationship between infrastructure index and GDP per capita.

Table 3.3: Cross correlation between Infrastructure index and GDP per capita

	Benin	**B-Faso**	**C-d'Ivoire**	**C-Verde**	**Ghana**	**Guinea**	**Gambia**
Benin	**0.82**	0.88	0.87	0.88	0.90	0.76	0.41
B-Faso	0.75	**0.81**	0.81	0.82	0.83	0.75	0.37
C-d'ivoire	0.89	0.93	**0.92**	0.93	0.94	0.76	0.41
C-Verde	0.88	0.93	0.92	**0.92**	0.94	0.73	0.38
Ghana	0.91	0.95	0.94	0.94	**0.93**	0.75	0.43
Guinea	0.95	0.97	0.98	0.97	0.94	**0.80**	0.27
Gambia	0.97	0.99	0.99	0.98	0.96	0.75	**0.24**

Source: Own computation using World Bank data

Table 3.4: Cross correlation between Infrastructure index and GDP per capita Cont.

	G-Bissau	**Liberia**	**Mali**	**Niger**	**Nigeria**	**Senegal**	**S-Leone**	**Togo**
G-Bissau	**0.97**	0.78	0.99	0.99	0.88	0.97	0.97	0.98
Liberia	0.95	**0.88**	0.96	0.96	0.94	0.92	0.91	0.95
Mali	0.96	0.86	**0.97**	0.97	0.93	0.94	0.93	0.96
Niger	0.97	0.83	0.98	**0.98**	0.91	0.95	0.95	0.97
Nigeria	0.93	0.93	0.93	0.93	**0.92**	0.88	0.88	0.93
Senegal	0.94	0.91	0.95	0.95	0.91	**0.91**	0.91	0.94
S-Leone	0.91	0.88	0.92	0.92	0.94	0.88	**0.89**	0.91
Togo	0.94	0.91	0.94	0.95	0.89	0.91	0.90	**0.95**

Source: Own computation using World Bank data

Apart from Gambia with a correlation of 0.24 which is below 0.5, all the other countries have a correlation coefficient of above 0.8. This indicates that there is a strong and positive correlation between the population's standard of living and infrastructure development in developing countries such as West African's. To this effect, the impeding factors to infrastructure development and or standard living in the West African region are explored further.

However, literature has revealed that financing of infrastructure is one of the constraints to infrastructure development in Africa in general and West Africa in particular. Of the varying models, the private participation in Infrastructure production has been of recent used by governments in the provision of infrastructure in developing countries. Additionally, foreign direct investment has played significant role in enabling infrastructure provisioning in Africa. A specific example of how markets have embraced PPP is the birth of *Road Funds* for infrastructure development. *Road Funds* was firstly established in Zambia and is now in 27 countries in Africa. Other regions such West and East Africa are making reforms to welcome the installation of road funds (Bricenio-Garmendia et al, 2008).

Estache (2005) finds that the cost of delivery of infrastructure in Africa is too high. He suggests a strong collaboration between the government and private Sector, but this in combination with a rigorous control of corruption. He also reports that participation by foreign private investors is lesser than it is claimed. The author also suggests that the interest of foreign private investors is more centered around the telecommunication sector over other sectors such as water and sanitation; and electricity. Chege and Rwelamila (2001) use the provision of prison in South Africa as case study and show that, the use of PPP models is an efficient ways of operating infrastructure projects and PPP provides additional fund for infrastructure operation.

3.2.4 Governance Issues - Impediments to PPP

PPP, being the "go-to" model in the provision of infrastructure at a low cost, leads this study to explore governance factors that if handled efficiently will improve the use of PPP and enhance infrastructure development in Africa in general and West Africa in particular. We use foreign direct investment as a proxy for foreign private investors' participation in the provision of infrastructure.

The Africa's Infrastructure Diagnostic has singled the European investment agencies as Africa's biggest partners in infrastructure investment. Table 3.5 below presents the cross correlation between FDI and different measures of governance issues. In order to do that, we use data on five different indicators, these are: *political and absence of violence* (PV), *voice and accountability* (VA), *control of corruption* (CC), *rule and law* (RL), *regulatory quality* (RQ), and *governance effectiveness* (GE).

Table 3.5: Cross correlation between FDI and governance indicators

	Benin	**B-Faso**	**C-d'Ivoire**	**C-Verde**	**Ghana**	**Guinea**	**Gambia**
PV	-0.42	-0.80	-0.62	0.29	-0.0005	-0.25	0.01
RL	-0.11	-0.24	-0.61	0.59	0.15	-0.27	0.24
RQ	0.16	0.32	-0.43	-0.19	0.83	-0.17	-0.39
VA	-0.36	0.35	-0.64	0.01	0.83	0.04	0.35
GE	0.14	-0.40	-0.67	0.45	0.40	-0.17	-0.29
CC	-0.18	-0.69	-0.66	0.20	0.75	-0.36	-0.63

	G-Bissau	**Liberia**	**Mali**	**Niger**	**Nigeria**	**Senegal**	**S-Leone**	**Togo**
PV	0.08	-0.05	-0.18	-0.83	0.42	-0.17	0.32	0.07
RL	-0.09	-0.17	-0.25	0.70	0.08	-0.53	0.58	0.15
RQ	0.002	0.04	0.38	-0.04	-0.01	-0.39	0.66	-0.61
VA	0.21	-0.41	-0.20	-0.46	-0.37	-0.72	0.18	0.39
GE	0.51	-0.15	-0.35	0.79	-0.03	-0.16	0.02	0.32
CC	0.28	-0.24	-0.40	0.81	0.44	-0.69	0.35	-0.15

Source: Own computation using World Bank data

There is a positive relationship between FDI and PV for Cape Verde, Gambia, Nigeria, Sierra-Leone, and Togo. Following Thomas (2009) interpretation of the World Bank world gov-

ernance indicators, this positive relationship observed implies that a better and stable political environment increases inflow of foreign direct investment in those countries.

However, the coefficient of correlation is below 0.5 for Cape-Verde, 0.01 for Gambia, 0.42 for Nigeria, 0.32 for Sierra-Leone and 0.07 for Togo. Countries such as Cape-Verde, Ghana, Gambia, Niger, Nigeria, Sierra-Leone and Togo exhibit a positive relationship between FDI and Rule of Law. Thomas (2009) defines *rule of law* as the frequency of crime and violence and the confidence of an agent in that his opponent will be abide by the law when there is conflict between parties. This study finds regulatory quality (RQ) to be positive in relation to FDI for: Ghana, Gambia, Guinea-Bissau, Liberia, Mali, and Sierra-Leone. A positive relationship is further observed between governance effectiveness (GE) and FDI for: Benin, Ghana, Guinea-Bissau, Niger, Sierra-Leone and Togo. Most importantly, the control of corruption (CC) has been effective in Cape-Verde, Ghana, Guinea-Bissau, Niger, Nigeria and Sierra-Leone, Mali and Sierra-Leone. Bekaert et al (2014) computed their own political risk and show that, a 1% fall in the political risk can increase the inflow of FDI up to 12%.

Jadhav (2012) investigated factors that influence FDI inflow into BRICS countries. He reported that, the stabilization of macroeconomic variables is significant and more indicative of FDI's inflow than political issues. To capture this aspect in the analysis, we also investigate the relationship between foreign direct investments and the real effective exchange rate in the region. The Economic Union for West African States has a currency union where CFA (i.e. currency in use) is use in Cote-d'Ivoire, Togo, Benin, Burkina-Faso, Senegal, Guinea, Guinea-Bissau as compared to Sierra-Leone, Ghana and Nigeria who use their own currencies. The Monetary union is under a fixed exchange rate regime whereas Nigeria and Ghana are under a flexible exchange rate regime. In order to investigate the relationship between exchange rate fluctuations and FDI, we run a cross-correlation analysis between the FDI and the real effective exchange in Six West African countries. These are Cote-d'Ivoire, Ghana, Gambia, Nigeria, Sierra-Leone and Togo. The result is presented in table 3.6 below.

Table 3.6: Cross correlation between exchange rate and foreign direct investment

	C-d'Ivoire	**Ghana**	**Gambia**	**Nigeria**	**S-Lione**	**Togo**
C-d'Ivoire	**-0.67**	-0.21	-0.03	-0.25	-0.06	-0.19
Ghana	-0.36	**-0.68**	-0.42	0.03	-0.42	-0.42
Gambia	-0.27	-0.62	**-0.67**	0.49	-0.53	-0.49
Nigeria	0.68	-0.01	-0.27	**0.03**	-0.05	0.03
S-Leone	0.07	-0.21	-0.74	0.37	**-0.25**	-0.29
Togo	-0.55	-0.30	-0.11	-0.34	-0.11	**-0.21**

Source: Own computation using World Bank data

The relationship provided in Table 3.6 indicates that five out of the six countries exhibit a negative relationship between FDI and the real effective exchange rate. Nigeria is the only country that exhibits a positive correlation between foreign direct investment and real effective exchange rate. The correlation coefficient for Nigeria is 0.03 which is observed to be less than 0.5. The coefficients are greater than 0.65 for Cote d'Ivoire, Ghana and Gambia. This analysis

reveals that, for the countries with fixed exchange rate regime such as Togo and Cote d'Ivoire as well as those with flexible exchange rate regime, there is a negative relationship between currency depreciation and inflow of foreign direct investment.

Compared to Bilawal et al. (2014) who investigated how exchange affect FDI in Pakistan, most of the selected countries in West Africa exhibit a negative relationship while Bilawal found a positive relationship between foreign direct investment and exchange rate in Pakistan. This allows us to conclude that, the factors that influence FDI are more depended on governance indicators than macroeconomic variables in African countries and West Africa in particular.

Chapter 4

Conclusion

The purpose of this study is to identify the root causes of infrastructure deficit, sensibly, theoretically contextualize other problems (that are not known) and explore tailored-approaches to infrastructure financing amidst the challenges facing Africa as whole and the West African region in particular. This study uses trend as well as cross correlation analysis to investigate the issue. Literature has revealed that, the Public-Private Partnership (PPP) is an efficient way of financing the infrastructure gap in Africa. The conventional approach to infrastructure funding based on government spending does not allocate any particular budget towards infrastructure investment but assumes that it is contained in the goods and services component of the budget. This method of addressing infrastructure development to mitigate the deficit in infrastructure is not without sizable problems, as it inhibits the evolution of infrastructure development in the region. Furthermore, government spending is accompanied by private investors whose investment is highly concentrated in limited sectors such as telecommunications and does not give much attention to other equally important sectors such as road infrastructure, electricity and water provision,etc. To this effect, PPP as an infrastructure financing model premised on literature is recommended for the West African region as it reduces risk and operates at minimum cost. The study finds that political stability and the absence of violence, voice and accountability and rule of law are crucial factors that warrant the attention of policy-makers of the region and/or individual countries as they are paramount in enhancing investor confidence and encouraging foreign direct investment.

We therefore recommend that emphasis be placed on the improvement in the management of institutions and the governance indicators by the various governments in the region, thus creating an enabling environment for PPP and other infrastructure financing models alluded to by this study to operate efficiently in addressing infrastructure development.

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Appendix A

African Infrastructure Development Index

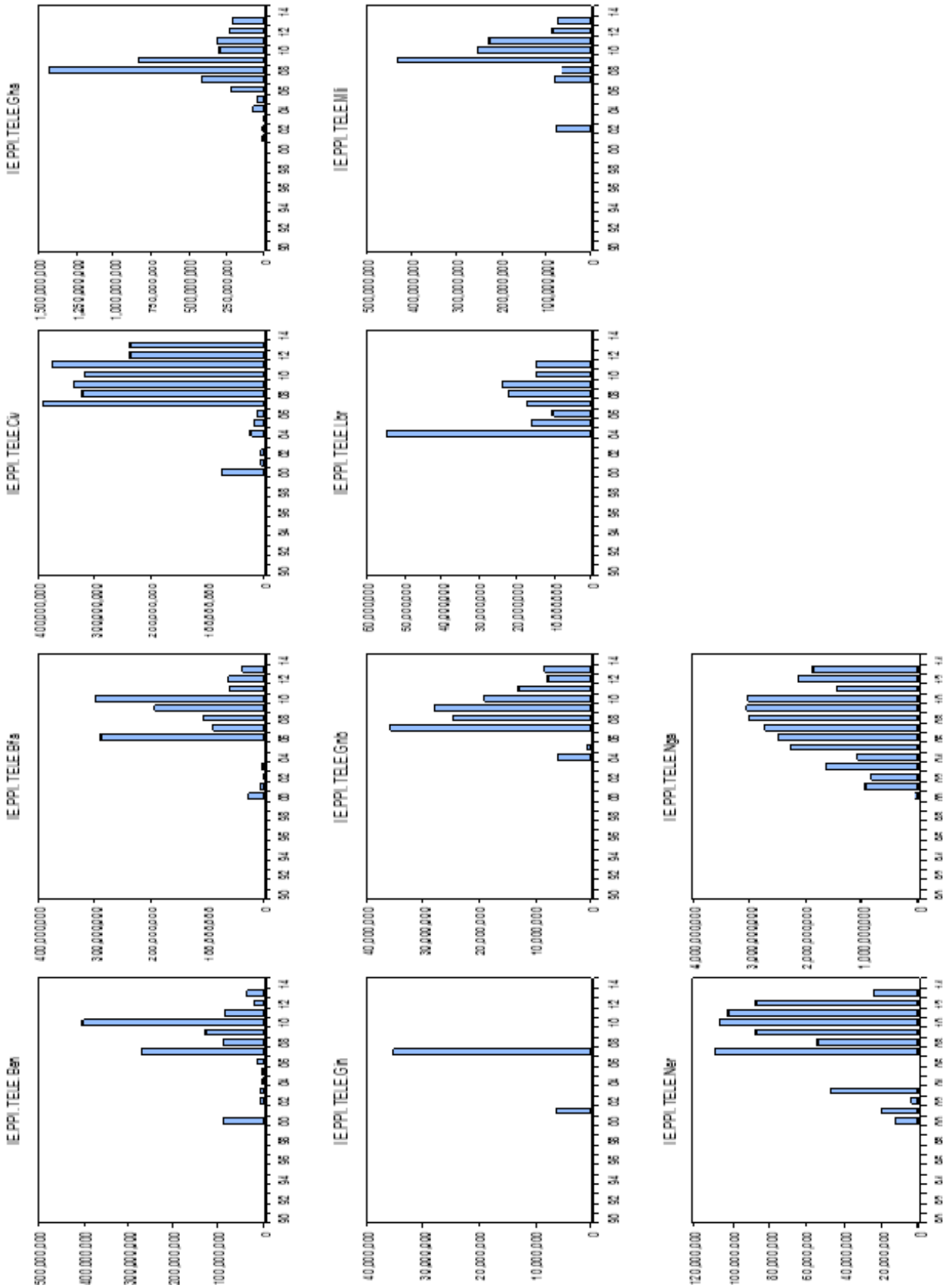

Figure A.1: African Infrastructure Development Index
Source: Own computation using AfDB data