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A META-ANALYSIS OF INFRASTRUCTURAL DEVELOPMENT IN THE NIGERIAN TELECOMMUNICATIONS INDUSTRY

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Abstract
In relation to countries, development is pervasive and its impact on one sphere of the economy is spiral. To the extent that national development is hinged on infrastructural development, this paper presents a meta-analysis of infrastructural development in the telecommunications sector of developing African countries. The objective is to determine the relative value placed on infrastructural development in the telecommunications sector by government as well as ascertain the degree of focus on infrastructural development in the sector among researchers. The methodology adopted is a mix of content analysis and meta-analysis of 15 articles published between 2006 and 2013 on the subject of infrastructure in the telecommunications sector. Using the Boolean search criteria of 'and,' 'or' and 'either' for key words in the paper title, and Google as the search engine, a total of 53 journal articles were retrieved but 36 of them were excluded for either not incorporating infrastructural development in the telecommunications sector or treating the subject outside developing African countries. Only 15 articles incorporated the key words and limited research presentation within the geographical region of developing African countries. Out of the 15 articles, only 7 made in-depth reference to the Nigerian telecommunication sector. Consensus of findings from the studies reveals that infrastructural development is yet to match the rising demand for telecommunications services in developing African nations. Similarly, inadequacy of capital was observed to be largely responsible for the slow pace of infrastructural development on the continent in comparison to same sector in Europe. Therefore, less attention is shown by researchers to infrastructure development in the telecommunications sector of Nigeria, and Africa as a whole. A major recommendation inferred from 67 per cent of the articles is the proposition that governments create an investor-friendly business environment with attempts to induce public agency partnership, involving private participants for increased investment in the telecommunications infrastructural development.

Keywords: *Infrastructure, Infrastructural development, Telecommunications and Development.*

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Background to the Study

The concept of development is multi-faceted. Indeed, development is multi-disciplinary in nature. Every nation is confronted with challenges of development. Specifically, national economics face challenges of development. Much more is it so far developing and less developed countries. However, several scholars and researchers have dwelt on development from different perspectives in relation to various sectors of the economy (Bhattacharyay, 2009).

While some scholars have used the concepts of growth, change and process to explain as well as measure development, others have explored theories to shed light on development. Use of development in the body of knowledge begins with the primary definition and, or conceptual analysis of development. It is evident that distractions and variations emerge in the definition of development given by management scientists, medical scientists, economists, pure scientists and other practitioners.

This paper assumes the technological perspective of development because focus is essentially on infrastructure which is on integral feature of national development. And any discussion of national development, to an extent, incorporates the role of infrastructure studies have shown that the level of infrastructural development in a country is a significant factor which determines the pane and diversity of economic progress (Todaro & Smith, 2009). It follows then that infrastructure is also an intervening and spiral factor in issues of socio-economic development without which there cannot be any meaningful sustainable development. Considering the explosion in the information technology and the increasing pace at which the telecommunications industry grows in African and other continents, through at different rates in each of the continents, an examination of the level of infrastructure which supports telecommunications is needful.

Nigeria is considered as one of the fastest emerging markets for telecommunications products with over 56 million telephone service subscribers in an economy where five active telecommunications service providers operate (Keshinro, 2010). Statistics reveal that eight (8) out of every ten (10) Nigerians possess a handset while 6 out of every 10 Nigerians possess two handsets or two SIM cards (Adegbenro, 2013).

As a developing country, Nigeria represents a simple of other developing African countries which have shown demonstration of citizens' attraction to communications gadgets. Nigeria's telecommunications sector has assumed the status of a fast growing emerging market comparable in part to a similar sector in South African and Kenya (Adegbenro, 2013). However, growth and efficiency of the telecommunications sector are predicated upon investment in infrastructure. The study was motivated by this research question: To what extent have researchers been engaged in studies in infrastructural development in the Nigerian telecommunications sector? To this extent, an examination of infrastructural development in the Nigerian telecommunication sector is worth scientific attention, which is embarked upon in this paper, using systematic review and a meta-analytical approach. In what follows subsequently, section 2 describes the review methodology and meta-analysis while section 3 presents issues addressed. Section 4 discusses results and findings. Section 5 highlights the conclusion and makes recommendations as well as areas for future studies.

Objective of the Study

The primary objective of this study is to determine the relative value placed on infrastructural development in the telecommunication sector of developing African countries and Nigeria in particular.

Methodology

The World Bank and researchers in developing economies have shown deep interest in the

telecommunications sub-sector of the Nigerian economy. This is evident in several World Bank reports published between 2002 and 2012 on development Africa. A systematic review of articles and papers dealing with infrastructure and telecommunications and published between 2006 and 2013 was undertaken. A total of 53 journal articles were retrieved using the Boolean search parameters. 36 of the articles were excluded for either treating infrastructural development outside the telecommunications sub-sector or treating the subject outside the context of developing African countries. Other articles were evaluated on the basis of their focus on the telecommunications situation in South America. Articles and papers were retrieved and gathered on the criterion that tithes of such presentations reflect *'infrastructure, infrastructural development, telecommunications, developing African countries, and Nigeria'*. Only 15 articles were finally selected and adopted for meta-analysis. All 15 articles incorporated the words and focused their treatment of telecommunications and infrastructure on Nigerian and other developing African countries. Consequently, the selected articles were subject to systematic review and context analysis.

Table 1: Number of Articles Per year

Year	Number of Articles
2006	2
2007	1
2008	2
2009	4
2010	1
2011	1
2012	1
2013	3
Total	15

The period of coverage was not specifically determined by the researcher, but by the results which emerged from the search engine used (Google). It was also determined by the response of the research to query issued. Consequently, by meeting the criteria, only the number of articles selected against each year was selected as sown in the table immediately above.

Literature Review

Brief on the Nigerian Telecommunications Sector

The Nigerian telecommunications industry was deregulated in 1992, with the licensing of Global System of Mobile telecommunication (GSM) operators (Deloitte, 2014). Licensing of potential telecommunication service provides revolutionized the sector which was prior to 1992 dominated by NITEL, a public corporation. The sector was characterized by gross service inefficiency monopolistic operations and slow growth before the deregulation programme (Yusuf, 2008). However, observation by public policy analysts revealed that efficiency of the telecommunications

sector is facilitated by investment in infrastructure by private organizations and foreign investors (Aker & Mbiti, 2010).

Deregulation of the sector provided impetus for development with attendant contributions to the Nigerian economy. Contribution of the telecommunications and services sector to the gross domestic product (GDP) is given as 44.3 billion US dollars (Deloitte, 2014). Several businesses in Nigeria exploit the output of the telecommunication sector. A case of the banking sector, where internet and mobile banking services have emerged as tools for competition edge, is illustrative as tools for competition edge, is illustrative of the productive potential of the telecommunication sector.

Between 1992 and 2013, a number of service provides in the industry have emerged. Although some providers have ceased to render services, MTN, Airtel, Glo, Etisalat and Visafone appear to be the prominent competitors (Nwosu, 2011). Government's intervention is specifically restricted to a regulatory role through the instrumentality of the National Telecommunications Commission (NCC). Largely telecommunications services are infrastructure-based. Service providers in the sector display network infrastructure through sub-contractors who provide as well as maintain infrastructure.

Infrastructural Development Issues

All the 15 articles reviewed show diverse definitions of both infrastructure and development. First, infrastructure is characterized as public goods, fixed investments (Ayogu, 2007), services which can funds for the state (Byoungki, 2006), output from government facility (Nwosu, 2011) and the entire public sector machinery (Andre, Guash, Haven & Foster, 2008). However, two categories of infrastructure were observed as: and infrastructure (physical and tangible), and soft infrastructure intangible (Bhattcharyay, 2009).

Several classifications have been shown for infrastructure, depending on the researcher's perspective. An emerging and observable dimension is further classification into economic infrastructure and social infrastructure. On the other hand, the focus on 'development' is assumed from the point of view of each article author and nature of subject matter. 9 articles mentioned economic development as part of the features of subject matter, 2 others make reference to social development, 2 others explore socio-economic development, 1 article is restricted to regional development while 1 other article dwells on technological development. All 15 articles demonstrate the extent to which development is pervasive as a concept, phenomenon or variable. Indeed, 2 articles treat development (tangible) as an infrastructural domain (Calderon, 2009).

A distribution (spread) of infrastructural development issues addressed by the articles is reflected in Table 1 according to the paper type.

Table 2: Distribution of Articles and Concepts based on Source

Concepts/Issues	Type of Source	No of Sources
Infrastructural development in the telecommunications sector	J	6
Infrastructure and national development	W	3
Telecommunications, development and growth	TR	2
Infrastructure and Africa	PD	4
Total	-	15

Key: J Journal; W - Working Paper; TR Technical Report; PD Paper Delivered

Table 1 shows that infrastructural development in the telecommunication sector is addressed in six journals while infrastructure and national development are discussed in three working papers. Telecommunications, development and growth are issues addressed in two technical reports. But infrastructure and Africa are embraced as major issues in four papers delivered. Journals are more prominent in the dissemination of infrastructural development in the telecommunications sector. A total of 15 sources covering journals, working papers, technical reports and papers delivered were featured and the analysis.

In any scientific and economic discussion of infrastructure, critical reference is made to contribution to gross cosmetic product (GDP) (Robertson, 2014). Table 2 gives indication of reference to, and association between telecommunications infrastructure and GDP.

Table 3: Correlation between Telecommunications Infrastructure and GDP

Source	Total	Reference Status	No of Sources with reference to GDP
J	6	Valid	4
W	3	Valid	3
TR	2	Valid	1
PD	4	Valid	2
Total	15	Valid	10

Out of 15 articles, only 10 made valid reference to the correlation between GDP and infrastructure in the telecommunications sector. 5 other articles made no specific reference to such correlation. In Table 2, from a total of 6 journals, only 4 journals made the reference. All 3 working papers reviewed, made the reference while only 1 technical report includes the reference out of a total of two technical reports. There were only 2 papers delivered with reference to GDP and infrastructure in the telecommunications sector.

Infrastructure investments accelerated the annual growth rate in Africa by over 13 percent, and the contributions and impact emerged from telecommunications, roads and electricity in that order (Estache & Goicoechea, 2005). Out of 15 articles, 7 of them (48.6%) integrated a discussion and analysis of both investment in infrastructure and its impact on telecommunication in developing countries.

Table 4: Related Issues and Span of Focus

Issues	Proportion of Source Coverage
Poverty	24.17%
Gross Domestic Product	18.33%
General Infrastructure	19.17%
Telecommunications Infrastructure	21.66%
Quality of Life	7.5%
Economic Investment	9.17%
Total	100

In all the articles reviewed, other related issues examined with or without data are reflected in Table 4. The extent, that is, proportion of coverage in each of the original articles is also shown. Prominent issues of economic significance in the discussion of the economies of developing countries include largely, poverty, GDP, general infrastructure, quality of life, economic investments and other specific types of infrastructure such as energy, roads and telecommunications among others.

However, this paper has observed the proportion of coverage of the related issues as reported in the table above. The issue of poverty is given 24.17%; GDP attracts the coverage of 18.33%; general infrastructure takes 19.17%; telecommunications infrastructure receives 21.66%; quality of life is accorded 7.5% while economic investments make up 9.17%. The largest coverage is given to poverty while quality of life attracts the least coverage.

The Nigerian Experience

Out of all the 15 articles reviewed, only 3 focused specifically on the telecommunications sector in Nigeria. The other 12 articles focused attention on developing countries, a significant proportion of which include African countries (Jerome, 2009). One of the three papers hinged discursive on low tele-density, increasing demand for telecommunication services and strong initiatives by the private sector to invest in infrastructural development in the Nigerian telecommunications sector (Yusuf, 2008).

From another paper, evidence is revealed of the potential market prospects in the Nigerian telecommunications services sector (UN-HABITAT, 2011). This marketability further explains the attraction of the Nigerian telecommunications sector to foreign investors (Byoungki, 2006). The third article survey broadband technology investment and inter-connectivity access rate in the telecommunications sector (Adegbenro, 2013).

Although some studies made a comparative analysis of the telecommunications situations in Africa, the focus was not entirely on Nigeria (UN-HABITAT, 2011). In Nigeria, government's privatization of NITEL (a state-owned telecommunications corporation) paved the way for development, growth, expansion and investment in the telecommunications sector with the entry of local and foreign investors. The most competitive markets in Africa are South Africa, Algeria, Nigeria, Kenya and the Democratic Republic of Congo, each of which has not less than three major telecommunications services providers, although South Africa demonstrates a high market penetration rate of 67% (UN-HABITAT, 2011).

Table 5: Africa's 15 Top Telecommunications Firms in 2008

Rank in 500	Company	Country	Turnover USD Billion)
5	MTN Group	South Africa	$10.3
7	TELKOM	South Africa	$8.33
9	Vodacom	South Africa	$7.13
15	Vodacom South Africa	South Africa	$6.39
20	ORASCOM	Egypt	$4.91
25	MTN South Africa	South Africa	$4.18
31	MAROC Telecom	Morocco	$3.60
41	MTN Nigeria	Nigeria	$3.00
64	Telcom Egypt	Egypt	$1.82
65	ORASCOM Tel. Algerie	Algeria	$1.76
87	Algerie Telecom	Algeria	$1.31
101	Zain Nigeria (Now Airtel)	Nigeria	$1.17
104	Soc Nat. De Telecom	Senegal	$1.13
111	Vodafone Egypt	Egypt	$1.05
129	Tunisie Telecom	Tunisia	$0.88

Source: Jerome (2009)

In spite of the growing number of private telecommunications companies in Nigeria, only two of them made the top list in 2008. MTN Nigeria and Zain (now Airtel) Nigeria, both occupying the 41st and 101st positions respectively. For MTN Nigeria, the turnover was 3 billion US dollars while Airtel recorded 1.17 billion US dollars. These records translate to a marginal contribution to the GDP of the Nigerian economy.

Results and Discussions

All the approaches adopted in the selected articles are diverse. Such diversity prompts the issue of standardization of methodology. In essence, there are methodological gaps and variance in the data used by all the researchers. Although the papers incorporated all the concepts as shown in the title of this paper, the objectives, philosophy, and design of each paper differ significantly from the other. However, the systematic review has generated specific results, observations and issues which can promptly redirect researcher's attention to, and review interest in telecommunications study with reference to the Nigerian economy. Of course, such a study can be replicated elsewhere, using any standard methodology.

While there is evidence of inequality in the representation of articles by source, the weighted coverage given to infrastructural development in the Nigerian telecommunications sector is still relatively low, given the fact that there is high correlation between available of infrastructural services and income levels (Yusuf, 2008; UN-HABITAT, 2011). There is every indication that researchers have not given adequate attention to transactions, development and the state of affairs in the Nigerian telecommunications sector irrespective of its potential prospects already reported in literature (UN-HABITAT, 2011; Aker & Mbiti, 2010; Adegbenro, 2013). The time-span of attention is 2006-2013. But 15 articles, giving only 3 articles with direct attention on the Nigerian telecommunications sector present a span limitation. There is coverage appears inadequate to draw up gaps for investment purposes or research involvement. However, the search engine used provided this limitation.

There is absolute silence on the financial investment of governments of African countries in the telecommunication sector. The paper that focused on the sector in Nigeria did make any reference in discussion or analysis to government's investment in the sector concept for reference to privatization of the sector. The issue of infrastructural development is wide and attention is essentially drawn to those areas where lapses, problems and inconsistencies tend to persist. The relative progress made it Nigeria's telecommunications sector should have motivated researchers and stakeholders' interest in sustainability of infrastructural development in the sector. Overall infrastructural development is yet to match demand for telecommunications services. While the cost of investment in the telecommunications sector remains high, inadequate capital is a huge challenge to new entrants.

Conclusion/ Recommendation

This paper has attempted to show the level of attention and significant motivation expressed by researchers in relation to the Nigerian telecommunications sector. It has also revealed that gaps still exist for future studies in the sector with reference in particular to infrastructural development and sustainability. Governments, divestment from the sector and its shift to a regulatory position create a huge opportunity for private investors, given the prospects in the sector. However, studies reviewed confirmed the emerging strong position prompts is sustainability of infrastructural development in the sector. However, one question that may still be asked is: What then should be new role of government in sustainability of infrastructural development in the Nigerian telecommunications sector? This is apt for future research.

This paper is not without its limitations especially with the time-span adopted and restricted literature. Future studies could increase the time-span and literature review coverage. However, it

is recommended that further liberalization should be enhanced in the telecommunications sector, given the space of technological innovation. Furthermore, government needs to create a conducive economic environment for more rapid infrastructural investment and development. There is also need for collaboration among telecommunications services providers in the area of infrastructure sharing. This phenomenon is relatively non-existent in Nigeria.

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