

TRENDS AND CHALLENGES IN ICT INFRASTRUCTURE INVESTMENT IN NIGERIA.

BY

Justin Egbe, Ph.D

(Deputy Registrar, Tansian University Umunya Anambra State)

Abstract

This study explores the trends and challenges in ICT infrastructure investment in Nigeria. Using historico-analytic and comparative study method, this study looks at the different Trends in ICT and the challenges encountered in ICT infrastructure investment in Nigeria in subtle comparison with other African countries. Since infrastructure investment is widely recognized as a crucial driver of economic development, while the quality, quantity and accessibility of economic infrastructure in developing countries like Nigeria lag considerably behind those in advanced economies, scaling up infrastructure investment is widely seen as a key pillar in national development. Infrastructure gaps are still large and bridging those gaps will require tackling several problems, in terms of additional financing and project selection and implementation. At a time when the ICT sector is most needed to bolster Nigeria's ailing national economy, the sector finds itself under considerable political and regulatory pressure, with the country sliding down global indices and some players even preparing to exit the market. The study therefore recommends that the ICT policy needs to be fully implemented while public-private sectors collaboration and partnership should be strengthened especially at the national level. It also recommends that Government at all levels should support and promote the growth of ICT sector by dedicating special funds and resources for the expansion of ICT infrastructure in the country. Furthermore, that ICT education should be inculcated in the school curriculum right from the primary education to the tertiary institutions in order to increase the knowledge base and develop human capacity of the economy.

Introduction

Information and communications technology (ICT) is an extensional term for (IT) that stresses the role of and the integration of telecommunications (lines and wireless signals) and computers, as well as necessary storage and audiovisual, that enable users to access, store, transmit, and manipulate information. The pervasiveness of ICT has brought about rapid technological, social, political, and economic transformation that has resulted in a network of society organized around ICT (Castells, 1996). Across the globe, there has been increased awareness of the usefulness of Information and Communication Technology (ICT) to enhancing growth and development. Global economies of the 21st century have come to realize that no country can become competitive in terms of trade, industry, manufacturing and services among others without adopting, deploying, integrating and utilizing ICT in various sectors. The breathtaking pace of penetration and uptake of mobile telephony and broadband Internet is supporting many new possibilities, products, and services; providing breakthrough ideas in agriculture, health, education, and access to finance; and helping local and international trade. It helps

to relate school experiences to work practices, contributes to radical changes in school, strengthens teaching and provides opportunities for connection between the school and the world (Davis & Tearle, 1999). It also provides new ways of communicating and lobbying, which transcends international borders, as shown by the role of mobile phones and the Internet in the waves of revolution that spread across Northern Africa in 2011. Furthermore, it provides researchers with a steady avenue for the dissemination of research reports and findings (Yusuf & Onasanya, 2004).

Since infrastructure investment is widely recognized as a crucial driver of economic development, while the quality, quantity and accessibility of economic infrastructure in developing countries like Nigeria lag considerably behind those in advanced economies, scaling up infrastructure investment is widely seen as a key pillar in national development. Infrastructure gaps are still large and bridging those gaps will require tackling several problems, in terms of additional financing and project selection and implementation. At a time when the ICT sector is most needed to bolster Nigeria's ailing national economy, the sector finds itself under considerable political and regulatory pressure, with the country sliding down global indices and some players even preparing to exit the market.

Most developing nations have embarked on various reforms that foster the use of ICTs in their economies. These reforms tend to yield little or minimal benefits to economic growth and development, especially when compared with the developed countries of the world. Technological advancement is known to impact fast rate of economic development. In Nigeria, policy on adoption of Information and Communication Technologies was initiated in 1999, when the civilian regime came into power of government.

This study intends to explore the trends and challenges in ICT infrastructure investment in Nigeria. We shall be looking at the different Trends in ICT and the challenges encountered in ICT infrastructure investment in Nigeria. This will in turn guide us into propounding a solution to these challenges.

BRIEF CONCEPTUAL ANALYSIS

Information and Communications Technology (ICT)

ICT, or information and communications technology (or technologies), is the component that enables modern computing. Although there is no single, universal definition of ICT, the term is generally accepted to mean all devices, applications that combine and allow people and organizations (i.e., businesses, nonprofit agencies, governments and criminal enterprises) to interact in the digital world. ICT is conceptualized as communication in whatever form used, accessed, relayed and transmitted (Olorundare, 2006).

ICT has been defined as ‘any technology used to support information gathering, processing, distribution and use’ (Beckinsale and Ram, 2006). The definition taken in this paper classifies ICT into information technologies, telecommunications technologies and networking technologies (Nicol, 2003). Thus, ICT are tools that comprise electronic devices that are utilized for the information needs of institutions, organizations, and individuals. The electronic devices include information machines (for example computer, hard and soft wares), networking, telephones, video, multimedia and the internet (Ibara, 2010), all of which are still widely used today alongside cutting-edge ICT pieces. ICT is sometimes used synonymously with IT (for information technology); however, ICT is generally used to represent a broader, more comprehensive list of all components related to computer and digital technologies than IT.

Infrastructure

This is the set of fundamental facilities and systems that support the sustainable functionality of households and firms, serving a country, city, or other area, including the services and facilities necessary for it to function. (O'Sullivan, [2003](#)) Infrastructure is composed of public and private physical structures. In general, infrastructure has been defined as "the physical components of interrelated systems providing and services essential to enable, sustain, or enhance societal and maintain the surrounding environment. (Fulmer, Jeffrey [2009](#))

Investment

An investment can simply be understood as an item acquired with the goal of generating income or appreciation. Appreciation refers to an increase in the value of an asset over time.

Infrastructure Investment

Infrastructure investment is a key component of the 2030 Development Agenda. However, the interest around infrastructure is not new. Since the 1990s there has been a wide body of literature looking at the possible development gains from investing in infrastructure. The economic importance of infrastructure investment has been analyzed both at project and macro levels. At a project level, the focus is on the social cost-benefit of infrastructure projects and their implied internal rate of return. The social cost-benefit analysis often tries to account for negative externalities. At a macro level, the impact of infrastructure investment is analyzed using aggregate production function with the assumption that infrastructure is complementary to other inputs in the production function. The macro literature shows that improvements in infrastructure could raise productivity, stimulate private investment and facilitate domestic and international trade thereby promoting sustainable growth.

The State of Nigeria's Infrastructure

Infrastructure development is one of the bases of assessing the achievements of democratic leaders and it is the foundation of good democratic governance. Agitation for infrastructural development is higher in democratic government than in military dictatorship or compared to developed countries. This is because the resources for provision of infrastructure are always scarce. Ethnic-interest agitation and lobbying are common things in democratic governance in developing countries. This is why the Office of Government Commerce (OGC) in United Kingdom, advised that infrastructure project initiation should be done by an office specifically established to do this job. (P3O, 2008)

The Infrastructural report of Nigeria just like any third world country is nothing to write home about. The housing situation is in a sorry state both quantitatively and qualitatively. The ICT sector is very poor compared to other developed countries. Most infrastructures are now decayed and need repair, rehabilitation or replacement. Government is the system that plans, organizes, controls and supervises the people who are resident in an area in order for all to have conducive-environment for living and a sense of belonging. Governments have the power to put in place all measures that it deems fit will make an environment beneficial for living for everybody.

Brief Historical Analysis of ICT in Nigeria

ICT in Nigeria can be traced back to the late 19th century, when the colonial government installed a cable link between outposts in Lagos and the rest of the country, and between Lagos and London. The first telephone connections were put in place in the 1890s, and the state spent the following four to five decades installing telephone connections in population centres. In the years running up to the nation's independence in 1960, the faltering colonial government, and then the newly independent country's own leaders, began working on what was to eventually become Nigeria's first nationwide telecoms network. Over the following 30 years telecoms network development was a central component of a series of consecutive, state-led five-year development plans. By 1993 Nigeria was home to some 780,000 fixed-line connections. At the same time, a number of Nigerians were nurturing an interest in computer technology. In 1978 a handful of enthusiasts came together to form the Computer Association of Nigeria, which became a major player in the widespread introduction and uptake of digital technology across the country in the ensuing years. Since undergoing a restructuring and rebranding as the Nigerian Computer Society (NCS) in 2002, the organization has become one of the ICT industry's major groups and a driving force behind ICT in Nigeria. In late 2015 the NCS broke ground on an N1bn (\$3.2m) national ICT center, which is expected to serve as a technology innovation center upon completion in mid-2017.

Statistical Analysis of ICT Performance in Nigeria Vis –a- Vis Some Other African Countries

The Nigerian telecommunications market is fully liberalized, highly competitive, and evolving with time. Adeyeye (2006) notes that Nigeria has the second largest telecommunication sector in Africa (second to South Africa) with a subscriber base of 20 million, but has a teledensity of less than 15% while Canada with a much smaller population has teledensity of 107%. Since 1992, a wide range of regulatory initiatives has been undertaken to open up the market to private operators to provide products and services across the entire spectrum of ICT market segments. These initiatives, particularly in relation to market entry, have resulted in an impressive 53% compound annual growth rate (CAGR) in overall fixed and mobile subscriptions since 2001. Quarterly telecommunications sectorial growth is up to 35%, and the sector's annual contribution to GDP was estimated at 6.73% in 2012. However, in spite of the widely publicized successes, Nigeria, as highlighted in this RIA Sector Performance Review (SPR), lags behind many other African countries with respect to a number of market indicators. Using nationally representative household survey samples, RIA's 2012 ICT Access and Usage Surveys in 12 African countries focused on household, individual and informal business ICT access and usage. Among RIA ICT Survey countries, Nigeria ranks 5th with respect to mobile penetration and 5th in terms of industry perception of the effectiveness of domestic telecommunications regulation. In terms of RIA's broader Pricing Transparency Index: Prepaid Mobile for 2012, Nigeria ranks 17th out of 46 countries in terms of the affordability of the cheapest prepaid mobile product from a dominant operator, and 13th out of 46 for affordability of the cheapest mobile prepaid product from any operator. The 2012 RIA Nigeria ICT Access and Usage Survey found that there is a general paradox in Nigeria's telecommunications market – of performance on the one hand and deficiency on the other – and that this paradox exists across all the sub-sectors of the market. For example, mobile telephony is experiencing huge growth simultaneous with a fixed sector in a downward spiral. The penetration of fixed telephony is a meagre 65,914 households, or 0.3% of total households in the country, in spite of the fact that the RIA ICT Survey found ample demand for both fixed and mobile telephony products. As a result of this anomaly in the voice telephony market segment, there has been virtually no fixed-line competition (in voice, data or internet provision) to the mobile companies. The fixed sector has been experiencing a persistent downward slide, while the mobile networks have at times been overloaded with voice and internet traffic. Consumer pressure on mobile networks is now creating significant quality of service (QoS) problems, as the vacuum in fixed services is putting a tremendous burden on mobile operators to deliver good quality voice, data and internet services – which could otherwise have been provided through fixed networks (if, inter alia, the regulation of the fixed sector had been effective). Internet uptake appears strong, but at the same time computer penetration is limited and fixed household internet is virtually non-existent. The RIA Nigeria ICT Survey of 2012 found that only 3.4% of households, or 747,025, have a fixed internet connection,

and 62% of internet users go online primarily via their mobile phone. It has been reported that 58.1% of Nigerian web traffic was via mobile handsets and other mobile devices in November 2012 (Stat Counter Global Stats, 2012). The poor penetration of fixed household internet is directly linked to absence of the fixed lines over which internet access products (e.g. ADSL) are typically delivered; low penetration of computers; and inadequate power supply. Paradoxes also hold when the ICT demand, access and affordability scenario is analyzed. The RIA Nigeria ICT Survey found that the majority (62%) of non-internet users were eager to use the internet if it could be made available within roughly 30 minutes' walking distance from where they reside. And 50% of mobile subscribers surveyed said that cost is the main limitation on increased calling activity while 60% of mobile subscribers said they would make more calls if costs were lowered.

Evidence for ICT Policy Action The bandwidth situation is also paradoxical. Since 2010, there has been a massive 2,705% increase in wholesale submarine bandwidth capacity, via landings at the country's coastal city of Lagos. However, terrestrial domestic networks to carry these links inland are in low supply, resulting in relatively minimal impact on retail pricing levels for internet access. There are several identifiable reasons for the market paradoxes. As at the time of this report, Nigeria does not currently have a single, approved, high-level policy document outlining the national strategies upon which growth of broadband so critically depends – though there were the signs of potential movement in this direction in 2012, with publication of a draft National ICT Policy and establishment of a Presidential Committee on Broadband. (The Committee produced a document entitled National Broadband Plan 2013-2018, which was made public in mid-2013 – after the period of study which is the focus of this report.). Regulatory policies and decisions tend to be one-sided and not holistic, and reactive as opposed to proactive, tending to eventually, and oftentimes inadvertently, favor one market segment at the expense of others. The general industry perception is that the Nigerian telecommunications regulatory environment is ineffective with respect to pricing, QoS, universal service obligations (USO), access to scarce resources, interconnection, and anti-competitive practices. Among the causes of this negative assessment is undoubtedly the decline in fixed telephone services arising from the failure of several efforts by government to privatize Nigeria Telecommunications Ltd. (NITEL), and the related downturn in the business fortunes of fixed-line companies. Although the future and prospects for the Nigerian ICT sector appear rich, achieving the necessary scale and pace of growth is predicated on finding the correct mix of regulatory initiatives and interventions needed to encourage greater competition among market players and deeper penetration and usage of the entire range of ICT services.

Current Trends in Information Technology

Technology is an ever-changing playing field and those wanting to remain at the helm of innovation have to adapt. The consumer journey is charting a new course and customers and

companies alike are embracing emerging technologies. As the IT industry trends such as cloud computing and SaaS become more pervasive, the world will look to brands who can deliver with accuracy and real-time efficiency. To help meet the demands of a technology-enabled consumer base, businesses and solution providers must also turn toward the latest trends and possibilities provided by emerging innovations to realize their full potential. Below are some of the latest trends in ICT:

Artificial Intelligence (AI)

AI holds significant potential for business. While we have yet to achieve the full spectrum of capabilities frequently at the center of futuristic cinema, AI is poised as a tool of choice for businesses and solution providers. As is often seen with social media, AI, combined with machine learning, can be a powerful combination. Businesses can use AI to achieve cost-saving benefits, streamline workflows, enable more efficient communications, improve customer satisfaction, and provide insight into purchasing behavior.

Block Chain

Past discussions of block chain are often hinged on crypto-currency, but the real power lies in the immutability and transparency of a block chain. Due to the fixed and highly visible nature of block chains, this trend has been widely accepted to have financial applications, and often informs discussions of bitcoin. However, the business benefits are much more far reaching. The block chain is an information system that holds promise for supply chain management, enabling transparency into the origin and journey of materials from origin to product.

Drones

Drones are helping to transform certain verticals, giving an edge over competitors and offering a technologically powered physical connection between businesses and end users. The remote capabilities of drones coupled with AI applications are transforming business in the industrial, public safety, construction, and insurance sectors, just to name a few

Edge Computing

Edge computing is a decentralized model which places computing nodes closer to the source of interaction. Computing can be seen as a model where information processing and content collection and delivery are placed closer to the sources, repositories and consumers of this information. This model optimizes technological interactions and reduces latency at the point of origin to enable more effective and real-time data consumption. Edge computing is quickly becoming the most efficient path for localized interactions.

IoT

As the world becomes more and more digitized, informed business is the key to success and internet of things provides greater clarity into consumer behavior. The Internet of Things is increasingly offering business opportunities in the form of data collection and analysis. In fact, IoT is the most widely adopted technology in CompTIA's emerging tech track.

These are only but a few IT trends. IT trends are so many but we only discussed a few as we can't discuss all.

Challenges in ICT Infrastructure Investment in Nigeria

Rapid developments in information and communication technologies (ICTs) in recent years have resulted in significant changes in the way the world operates and communicates. Information and communications technology (ICT) represents an enormous opportunity to introduce significant and lasting positive change across the developing world. The rapid penetration of mobile access in particular has resulted in considerable improvements in the lives of the poor in both rural and urban contexts. All evidence suggests that this trend is going to continue, as the availability expands and the cost of access continues to decline. However, this new potential and opportunity is accompanied by significant challenges and possible threats and such challenges include:

Sustainability and Scale

The use of ICT in development programs supported by INGOs has, to date, been relatively ad hoc, with many examples of small initiatives or pilots but very few large-scale, sustainable, ICT-supported programs. To unleash the full potential of ICT in development programs, a new level of collaboration, both internally and with other organizations, and a new approach to scaling solutions to achieve a really material impact are needed. This will necessitate significant coordination between technology companies, private sector organizations, universities, and government entities (central and local), as well as with traditional development partners.

Lack of knowledge

Many offices are not well equipped internally to support and nurture the effective exploitation of ICT to benefit development. They simply do not have the knowledge, expertise, or organizational capacity needed. The use of information technology is often seen as a thorny, problematic issue relating to back office systems. Furthermore, ICT often has a questionable reputation as a result of previous unsuccessful or costly initiatives.

Pace of Change

Nigeria's current structures, staffing, and ways of operating have a strong momentum that is not easy to halt or redirect. It is relatively easy to utilize ICT to sustain and improve current organizational constructs and approaches, making useful but incremental progress. It is incredibly difficult to conceive of new ways of working with organizational constructs that are fundamentally different from the status quo and require a shift in terms of strategy, competence, skills, and organizational structure.

Funding

There also is a significant challenge in adequately planning and financing the use of ICT in development programs. With cyclical donor funding and pressure to minimize administrative and management costs, it is often difficult for INGOs to properly plan and resource financial and human investments in ICT as a core capacity for development programs.

Legal/ Curriculum

Developing countries, as late adopters of technology, often do not have the necessary rules and legislation to resolve technology-related issues. This leads to complications when verdicts should be reached on disputes pertaining to privacy, content ownership, security breaches, etc. In order to address this inadequacy, the legislation body should either adopt and customize rules and policies from developed countries or develop its own regulations.

New technologies and systems demand new regulations. These regulations can best be achieved by adapting the existing evolved regulation in developed countries. In addition to having proper rules and an acceptable legal basis, the corresponding decision makers and law enforcers including, for example, judges, officers and lawyers should have a general understanding of ICT as well. This can be achieved by either changing the curriculum and introducing ICT-related courses, or having an additional training program to acquaint them with a rudimentary knowledge of ICT and its application. According to Haddad (2007), introducing TVs, radios, computers, and connectivity into schools without sufficient curriculum-related ICT-enhanced content is like building roads but not making cars available, or having a CD player at home when you have no CDs.

Human Resources

In those developing countries that enjoy and rely on natural resources such as oil or diamond, the value and importance of human resources is often neglected or underestimated. Instead of acquiring the necessary knowledge to develop technology and foster innovation, such systems tend to acquire ready products or technologies. Possessing high-tech technologies and facilities sometimes creates the illusion of independence and modernization, which intensifies the ignorance towards human resources including experts and the elite, culminating in a faster and wider brain drain. As Haddad (2007) notes, appropriate and effective use of technologies involves competent and committed interventions by people. Without knowledgeable human resources as holders of tacit knowledge, the “indigenous capacity for societal transformation” will not be fulfilled and the country turns into an unwise consumer of foreign products, which in the long run increases its dependence on technology-providing nations. Moreover, without the necessary knowledge, the acquired technology is often deployed in ineffective ways.

There are other hosts of challenges facing ICT infrastructural development in Nigeria but we only explained few. While some of these gaps still exist, they are, arguably, not as clear or compelling as they once were. We can see that developments and possibilities created through ICT, directly and indirectly, materially change the landscape in relation to many of these gaps

Evaluation

ICT is becoming an essential tool to improve social and economic development of any nation (Kehinde, 2016). Despite facing many challenges, most local players are broadly optimistic about the future of Nigeria's technology industry. The rapid uptake of mobile data subscriptions over the past few years, plus the steadily rising number of smart-phone handsets in circulation indicate significant unmet demand for digital products and services.

The nation's small but rapidly expanding indigenous ICT segment has developed a range of services tailored to the specific needs of this new domestic market, including digital streaming platforms that host large amounts of African content and online marketplaces that sell locally made products.

Supporting ICT innovation and entrepreneurship has become a central component of the government's technology development strategy in recent years to improve the country's productiveness and efficiency. Investment in ICT often has a trickledown effect to other sectors of the economy, with broader gains in efficiency and productivity. Nigeria's large and increasingly sophisticated market for ICT products and services – it is home to Africa's largest population and is arguably its largest economy – will likely drive technology sector development and the broader economy in the years to come.

Conclusions and Recommendations

ICT solutions, if applied wisely, can increase the success of organizations and the efficiency and transparency of governments. Generally speaking, developed countries have facilitated the vast potential of ICT and the Internet in every stratum of society. This has led to extraordinary results in reducing costs and increasing the life standard of their citizens. Yet many developing or less developed countries, particularly those with a low value for their corruption perceptions index (CPI), still cannot leverage all the potentials of ICT due to various reasons. Some of which include legal deficiencies, poor technical infrastructure, social barriers or lack of skilled human resources

From the foregoing, it is evident that Nigeria has a whole lot of investment and business prospects in her ICT sector, especially in terms of infrastructure. The Internet and mobile cellular subscriptions are on the increase and show a great expansion potential, which the private sector can

exploit for further investment and growth of the ICT sector. Furthermore, the ICT policy needs to be fully implemented while public-private sectors collaboration and partnership should be strengthened especially at the national level.

Government at all levels should support and promote the growth of ICT sector by dedicating special funds and resources for the expansion of ICT infrastructure in the country. Tino (2003) suggests the following possible sources of funds and resources for ICT use programs: (1) grants, (2) public subsidies, (3) private donations and fund raising events, and (4) community support

ICT education should be inculcated in the school curriculum right from the primary education to the tertiary institutions in order to increase the knowledge base and develop human capacity of the economy. On the average, Nigeria's ICT sector has shown immense prospects and possibility for future growth and development especially in helping to facilitate full implementation of the current campaign for a cashless economy and e-commerce. While there are huge potentials in this sector, it is noteworthy that there are challenges facing the growth of the sector. This is another area for further research.

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