

Economic Growth with ICT Investment Boom in Nigeria

Cheng Huifang, Waleola Folakemi, Oji-Okoro Izuchukwu

Abstract— Information and Communication Technology (ICT) is seen in the world as an indispensable tool in globalisation process. Nigeria is not left behind as the changes that have taken place in the telecommunication sector in the country can only be described as phenomenal. This paper tends to investigate how ICT investment is booming at par with economic growth in Nigeria. Secondary data was used for this study, data collected was analysed with econometrics techniques. The econometrics technique used was specified and Ordinary Least Square method (OLS) was used in estimating it. The empirical findings revealed that ICT contributed significantly on Nigeria economy during the period reviewed. The R-square result of 96%, showing a high proportion of total change in GDP is accounted for by private investment in ICT, ICT contribution to GDP and number of subscribers. However, it was recommended that in order to sustain economic growth and retain private investment in the sector, the government should provide favourable environment for investors and allow accessibility of information in order to curb insecurity in the country.

:

Index Terms— Information and Communication Technology (ICT), Economic Growth, Nigeria, Gross Domestic Product (GDP), Foreign Direct Investment (FDI), Emerging economy.

I. INTRODUCTION

The world is becoming a global village with information and communication being an indispensable tool for globalisation process. These has caused a significant increase in the use of Information and Communication Technology (ICT) in developing countries especially Nigeria. ICT is seen as an umbrella term that includes any communication devices or applications such as network hardware and software, cellular phones, computers, print or electronic media etcetera. It is instructive to note that most developed countries have taken advantage of numerous benefits of ICT to appreciably enhance their developmental profile particularly in the areas of human capacity building and knowledge management of which Nigeria as a developing country is trying to tap from the positive revolution.

This paper attempts to investigate the impact of ICT investment as it relates to economic growth and it's benefits accruable to Nigeria. The growth of an economy is popularly

measured using the Gross Domestic Product (GDP), even when some Economists argue that GDP is an imperfect measure of the state of an economy because of differences of statistics used. Since GDP is of critical economic importance and it calculated using the total value of all goods and services produced within an economy each year and government rely heavily on its figure to shape policies. We will use GDP as the economic measurement for Nigeria to examine if ICT investment is at par with its growth.

There is an indication that the Nigerian economy is gaining from the communication sector, with a display of transparency, openness and non-intervention, which turned the fortunes of the country around, and consequently raised investor's confidence in the Nigerian communication sector and the economy. Likewise, ICT has also increased employment generation, reduced transportation costs, increased business efficiency, attracts foreign funds, and a host of other benefits.

In this paper, we therefore address the question "what is the relationship between economic growth and ICT investment in Nigeria? What is the Federal Government doing to support and retain favourable environment for further investment?". Bearing in mind that in the past decade, there have been a number of foreign direct investment (FDI) in ICT. Since the year 2000, ICT revolution in Nigeria has boosted the economy greatly in terms of employment generation, organisational growth, economic, etcetera.

The paper is structured to discuss the Nigerian economy at a glance, brief history of ICT in Nigeria and introduce the context of the study. The next section discusses the Literature review on ICT and economic growth. While the method section provides an overview of the method applied, followed by the interpretation of our findings in the discussion sections. Finally we ended with the conclusion section with relevant recommendation for the government.

II. NIGERIAN ECONOMY AT A GLANCE

Nigeria is the single largest geographical unit in West Africa. The average growth rate of real GDP of Nigeria was 5.9 per cent in the period 1960–70, and rose to 8.0 per cent in 1971–73. The rapid expansion was a result of its oil production and export activities but it experienced a decline in the growth rate from 1976-80. With improvement in agricultural industry, it was able to sustain it through out the 90's. Policy tightening eventually helped to create Real GDP growth rate of 8.3 percent during the period 1999–2007 and it's still growing till date.

Manuscript received December 17, 2014.

Cheng Huifang, College of Economics and Management, Zhejiang University of Technology, Hangzhou, P.R China 310023.

Waleola Folakemi, College of Economics and Management, Zhejiang University of Technology, Hangzhou, P.R China 310023.

Oji-Okoro Izuchukwu, School of Economics, Wuhan University of Technology, Wuhan P.R China 430070

In 2014, with the rebasing of the country's GDP has set to transform Nigeria into the continent's most important economy measured in terms of GDP size, with an estimated growth from \$292 billion to \$510 billion, ranking in the world's 26th with an average annual growth of 7 percentage in real time. It's growth has led to it being called one of the (Mexico, Indonesia, Nigeria and Turkey) MINT counties similar to how in 2001 the world began talking about the BRICS countries (Brazil, Russia, India, China and South Africa) as potential powerhouses of the world's economy. MINT was coined by economist Jim O'Neill, comprising of Mexico, Indonesia, Nigeria and Turkey. These emerging economies are projected to be of high growth because they have good "inner" demographics, and presumed to see a rise in the number of people eligible to work relative to those not working and this is can help them match Chinese-style double-digit rates.

Despite its magnificent growth, the country is still lacking diversification in its economy which is highly dependent on oil exportation, accounting for more than 80 per cent of government revenue, which makes an enlarged GDP do little to immediately improve the life of nearly 100 million of its citizens living on less than \$1 a day. However, with possible agriculture and power sector reforms set to improve Nigeria's fortunes, turbulent politics and a resilient insurgency in the northern part of the county will take some of the shine off its positive growth story.

III. BRIEF HISTORY OF ICT IN NIGERIA

Ogunsola & Aboyade (2005), defines Information Communication Technology referred to as ICT as the use of computer systems and telecommunication equipment in information processing. It is a system of universal access and its attributes has distinguished it such that it has become a core part of our day-to-day life.

Looking back, twenty years ago the Information Communication and Technology sector was a goal in Nigeria not a reality. In 2001, Nigeria had about 40,000 connected lines and just 25,000 analogue mobile lines nationwide. The connection costs were very high and mobile phone usage was available to just a privileged few. However, owing to sector reform policy by the federal Government with a stable regulatory regime, there has been a rapid development in telecommunication and information technology of which there is a huge potential in the Nigerian market. With the establishment of Nigeria Communication Commission (NCC) as a regulatory body, it has licensed Digital mobile operators, Internet Service Providers, a National Carrier and Fixed wireless Access Operators to promote competitions in the market. As a result of these, there has been a rapid deployment of ICT services nationwide.

Nowadays, a large number of Nigerians have access to ICT basic tools such as Mobile Phones, Internet access, Computers, and so on. It is imperative to note that while connected lines grew to an average of 10,000 lines per annum in the last 4 decades between 1960-2000, in only 7 year between 2001-2008, an average growth rate of 8 million lines per annum was attained. Towards the end of 2008, fixed and

mobile active subscriber base was at 64 million. However, this growth has been propelled by a boom in private investment on the telecommunication sector. Looking at our world today, the technology era has improved greatly, its accelerated into hardware, software, the internet, telephone, application, support service and available.

ICT has proven to be effective and crucial to our daily lives. It has improved productivity in business sectors, private sector, creating immediate and long-term economic growth in businesses and overall creating growth to the economy. It's surprising how we are not able to do without it in today's world. Other unique attributes of ICT in our world today includes transaction costs reduction, immediate connectivity between suppliers and consumers, substitute for more expensive means of communication and transaction, increased choice in the marketplace, access to unavailable goods and services, widened geographical scope of potential markets, channels knowledge and information of all kinds between people, firms and government.

The importance of ICT in growth dynamics of a country has led many researchers to study the impact of ICT on growing economies and various aspect of the economy. However the study of how the usage of this system impacts the economy has not being fully explored. The data used here will cover the period when private ICT investment was introduced in Nigeria and it's impact on the economy from that year till date.

IV. LITERATURE REVIEW ON ICT AND ECONOMIC GROWTH

The impact of ICT on an economy has been studied by several researchers using different techniques and approach. Moradi & Kebryaee (2010), investigated the impact of ICT investment on economic growth in a cross section of 48 Islamic countries using Panel data analysis to examine the factors affecting economic growth to understand the current state of ICT and macroeconomic situation of the 48 Islamic countries. They applied Solow growth model to take into account the technological progress that may be in the form of ICT investment and human capital. Their findings showed that the main engines of economic growth were ICT capital, non-ICT capital and human capital in the sample of 48 Islamic countries.

Okogun .et al (2012), explored the economic value of ICT investment in Nigeria. The research showed that ICT investment was on the increase from 2001 when the telecoms industry in Nigeria got their liberalisation and the empirical results suggested that ICT investment had a significant impact on Nigeria's economic growth during the period reviewed between 1999 to 2009 suggesting good payoffs from ICT investment. The R-squared result showed high proportion of about (95%) total change in GDP is accounted by private investment in ICT. The study concluded that ICT contribution to GDP by the private sector contributed significantly to the country's growth.

In the report by African Partnership forum on ICT in Tokyo (2008), they identified the structural transformation of African economies as on-going to a faster pace. It further

explained how ICT is key factor that has helped contribute to the growth trend in several African countries as a result of: (1) increased productivity across all sectors; (2) market expansion beyond borders which helped to provide economies of scale; (3) lower cost and access to services such as education, health and banking; (4) provision of access to research; (5) development of ICT products and services; (6) contribution to better governance.

The use of ICT provides positive externalities such as enhancing creativity, learning and problem solving skills, new types of exports and increases FDI. These externalities require the interplay of many factors of which ICT is Key. The interaction among ICT connectivity, access, network security, capability, skills, market structures and firm governance, as well as the regulatory and facilitation environment, will determine whether firms from developing countries can participate effectively and efficiently in the information economy and compete in global e-market places.

Waverman. et al (2005), explained that a sizeable part of Nigerian economic growth is from ICT investment. He describes telecom services market as a key pillar of growth. To support his claim, the Pyramid Research Institute in (2010) estimated that total service revenue generated by mobile operators in Nigeria has increased significantly, from \$135m in 2001 to roughly \$7.0b in 2008. The mobile market had grown to represent more than 80% of the overall telecom services market in Nigeria. This puts the mobile sector at roughly the level of the manufacturing sector but above transportation, the finance sector and government services. His study reveals that, after analysing the impact of mobile telephony on GDP between 1980 and 2003 in 92 developed and developing countries, mobile telephony played a vital role in the growth level just as it had played a role in the developed world in the 1970s and 1980s. He further explained that the economic impact of mobile telephony in our current developing country is twice as great to developed countries.

V. CHALLENGES OF ICT IN AN ECONOMY

The introduction of ICT into Africa has raised many problems ranging from integration of local languages into the system, updating of materials that are posted on websites and most importantly, the question of security. Nigeria is a multi culture country with many spoken and written languages. This local language integration in ICT system is a big challenge to many people.

Aduwa-Ogiegbaen & Iyamu (2005), acknowledge ICT to improve means of communications but identified several obstacles regarding ICT in Nigeria. Nigeria still experiences high ICT cost, weak infrastructure, lack of skills, lack of relevant software and limited access to the Internet in the rural area. The price of computer hardware and software continues to drop in most developed countries, but in developing countries, such as Nigeria, the cost of these gadgets is still relatively high.

Another growing concern is that ICT is a challenge in the case of job elimination. It is true that ICT can save a great deal of time in task completion over time, but this rapid job completion has an over lapping effect on recruitment of people to do some task. In a country like Nigeria, unemployment record is high and if ICT creates more room for human replacement, then it poses a threat to the labour force.

ICT Security breaches are another problem that any economy can face. Dependency on ICT tools for information storage in electronic database facilitates for conducting business is very efficient because of its fast pace, however the system is vulnerable to security breaches, particularly when they are accessible via the internet. If appropriate measures are not in place, unauthorised individuals may access confidential data information may be altered, permanently destroyed or used for wrong purposes.

Bushati et al. (2012) shows that "ICT can create a partition, digital gap within the classroom, where students more familiar with ICT have more benefits and learn faster than others not familiar to technology. An ICT research carried out by McPake et al. 2005 on the influence of ICT in home and children preparation at primary school level reveals that the benefit of ICT on output varies. The assumption underlying their study is that young children who have varied and extensive access to ICT at home may be in a better position to take advantage of the opportunities to learn with ICT when they start primary school. But children's early experiences with ICT at home are likely to be influenced by their families' socio-economic status based on factors like, income, educational, work, backgrounds of adult family members, their families' and communities' cultural affiliations and, more specifically, their families' interest and expertise in relation to ICT.

VI. METHODOLOGY

The study employed an Ordinary Least Square (OLS) method to ascertain the parameters of the model, as to modify the Autoregressive Distribution Lag (ARDL) framework develop by Pesaran (1997,1999) to model the ICT investment in Nigeria over 14 years period. Moreover, in order to determine the impact of ICT on the Nigeria Economy, the use of content analysis of relevant literature reports from various scholars was corroborated in the section of some macroeconomic variables for the result. We used annual data from the period of 1999-2012 as of the time when the privatisation of the ICT sector commenced in Nigeria.

The annual variable of Gross Domestic Product (GPD), ICT contribution to GDP, Number of Subscribers and private investment in telecommunication data were sourced from Central Bank of Nigeria and Nigerian Communication Commission (NCC).

$$GDP_t = a_1 + a_2PI_t + a_3ICT + a_4NS + \epsilon \dots \dots \dots (1)$$

Where

GDP = Gross Domestic Product

PI= Private Investment in telecommunication

ICT= ICT contribution to Gross Domestic Product

NS= Number of Subscribers
 ε= Error term

E-views. It is interesting to note that greater percentage of ICT investment in Nigeria are being financed through private investment, hence it is assumed that a significant relationship exist between influx of private investment and ICT in Nigeria.

From the theoretical perspective, the model as specified is such that we can be able to test the bi-variate economic relationships as state in the objective of the study using

Table 1.1

	Coefficient Determinant					Error Term	Durbin-Watson	F-Statistic	T-Statistic
R ²	PI	ICT	NS	Const. Value	Sig.	ε	D	F	T
0.962	14.5233	17.2013	0.01438	390931	0.0000	20643.205	1.6824	42.650	18.321

Table 1.2

	Coefficient Determinant					Error term	Durbin-Watson	F-statistics	T-stats
R ²	PI	ICT	NS	Const. value	Sig.	E	D	F	T
0.962	14.5233	17.2013	0.01438	390931.07	0.000	20643.205	1.6824	42.650	18.321

A. Interpretation of Results

The regression model of private investment in telecommunications (I) and unemployment to gross domestic product (GDP),

$$GDP_t = a_1 + a_2PI_t + a_3ICT + a_4NS + \epsilon \dots\dots\dots (ii)$$

Equation (ii) to equation (iii)

$$GDP_t = 390931.07 + 14.5233PI + 17.2013ICT + 0.014387NS + 20643.205 \dots\dots\dots (iii)$$

$$GDP_t = 392995.275 + 14.5233PI + 17.2013ICT + 0.014387NS + \dots\dots\dots (iv)$$

This finding shows that the investment into ICT in Nigeria helps provide capital for the telecommunications sector, which is also used in acquiring resources, needed which eventually increases ICT total production. This availability of incoming investment helps to increases gross domestic product. Because of the profitability ratio in ICT, investors tend to commit more capital into this sector and that drives the growth higher.

The result shows that ICT contributes immensely to Nigerian GDP and all variables employed have a positive relationship with GDP. However, at a constant GDP of 392995.27 million, every 1 per cent increase in PI will lead to a GDP increase of 14.5233 multiple effects. Implying that there is positive relationship between PI and GDP. Also at a constant GDP value of 392995.27 million every 1 per cent increase in ICT will lead to a GDP increase of 17.20131 multiple, which is a multiplier effect. Finally at a constant GDP value of

392995.27million every 1 per cent increase will lead to a GDP increase of 0.014 multiple.

The overall result showcase a significant value of R-square of 0.96, showing that the dependent variable account for 96 per cent variation of GDP with only 4 per cent accounted by error term, this confirms the validity of the variables as a proxy of ICT growth and clearly indicates that the model capacity to predict the relationship between dependent variable and other independent variables. The Durbin-Watson statistics at 1.68 is close to 2, which implies that the model has no first order auto correlation and suggest positive serial correlation meaning the model is fit and reliable.

Furthermore, the result shows that there is a linear relationship between the variable employed due to it significant value of (0.000). The result also shows the linear relationship between all the variables employed as the F-statistic value at (42.650) is greater than the probability value of (0.000) confirming the significance of the entire variable combined together in the model. Likewise, the T-statistic value of (18.321) is greater than the probability value of (0.000). Indicating that the independent variables are significantly and substantially contributing to the variation in the dependent variable.

VII. CONCLUSION AND RECOMMENDATION

Based on the analysis, there is proof that ICT has contributed greatly to the GDP figure in Nigeria, and its growth level is steady. However, there are many problems existing, limiting how much of an outreach and positive changes ICT can make in the economy. Based on the recent economic report from Nigeria in 2014, there is still an increase growth in the output of ICT however at a slow pace compared to previous years.

The use of ICT produces several positive externalities, such as creativity enhancement, learning, problem-solving skills, high employment, import and exports increase, foreign direct investment of every kind increases and all this are made possible by several factors linked around ICT. Our recommendation to Nigeria will be, to make all this factors interplay and stimulate growth by providing network security, market structure and firm regulatory system. There is need for more ICT literacy at school, government level business and so on. An efficient use of ICT will allow high performing growth in every economic sector.

We suggest openness in ICT sector data collection for utilisation of technology expertise in the fight against security issues like the insurgency in Nigeria. We recommend that relevant stakeholders in the ICT and security sectors in Nigeria should allow access and ability to share information easily and quickly especially for security purposes.

The government should speed up the delay in the on-going rural telephony connectivity to enhance telecoms operation in the rural areas since most insurgency related groups often hide out in rural locations to avoid detection. A stable network of ICT in such communities will help reduce insurgent chances of staying hidden as they will be easily located or tracked.

In conclusion, basic infrastructures need to be improved on, because ICT software and hardware require power supply, which will enable frequent use. The government should encourage domestic private investment into ICT to encourage people to learn and create software's that will enable the use of Nigerian ethnic languages to be able to tap into all levels of creativity from all parts of the country to encourage technology transfers localisation.

REFERENCES

- [1] Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. (2005). Using Information and Communication Technology in Secondary Schools in Nigeria: Problems and Prospects. *Educational Technology & Society*, 8 (1), 104-112.
- [2] Akadiri .O.A, Olusanya .A.A & Omitola .O.O (2009). "Impact of Improved Telecommunication Services on Health Care Delivery in Nigerian Teaching Hospitals – A Survey of Opinions". *Journal of Information Technology Impact*, Vol. 9, No. 3, ppt. 125-134.
- [3] Jalava, J. & M. Pohjola, (2002). "Economic Growth in the New Economy: Evidence from Advanced Economies", *Information Economics and Policy* (14) 2 (2002), pp. 189-210.
- [4] Kehbuna .L, (2006), The role of ICT in the economic development of Africa: The case of South Africa. *International Journal of Education and Development using ICT* , Vol. 2, No. 4.
- [5] Khuong M. V (2011), ICT as a source of economic growth in the information age: Empirical evidence from the 1996–2005 period, Elsevier: *Telecommunications Policy*, Volume 35, Issue 4, May 2011, Pages 357–372.
- [6] Krubu .D.E & Osawuru .K.E, (2011), "The impact of Information and Communication Technology (ICT) in Nigeria". *Universities Libraries*.
- [7] Moradi M.A, Kebryaee M (2010). Impact of Information and Communication Technology on Economic Growth in Selected Islamic Countries, <http://www.ecomod.org/files/papers/987>.
- [8] Ogunsola L.A & Aboyade W.A (2005). "Information and Communication Technology in Nigeria: Revolution or Evolution", *Hezekiah Oluwasanmi Library, Obafemi Awolowo University, Ile-Ife, Nigeria, J. Soc. Sci.*, 11(1): 7-14.
- [9] Okogun O.A, Awoyele O.M & Siyanbola .W.O (2012). "Economic Value of ICT Investment in Nigeria, Is it Comensurate?".

International Journal of Economics and Management Sciences, Vol. 1, No. 10, 2012, pp. 22-30.

- [10] Olajide S.F. (2013). "Information and Communication Technology (ICT) and Insurance Companies Profitability in Nigeria", *International Journal of Business and Management Invention*, Volume 2 Issue 1 | January. 2013| PP.84-92.
- [11] Waverman, L., Meschi, M., & Fuss, M. (2005). "The impact of telecoms on economic growth in developing countries in Africa," *The Economic Impact of Mobile Phones*, Vodafone Policy Paper, Series, Number 3.

Professor Cheng Huifang , Dean, College of Business Administration, Zhejiang University of Technology.

Waleola Folakemi, Doctorate Student: College of Economics and Management, Zhejiang University of Technology, Hangzhou, P.R China. Research: Proceedings of the 7th International Symposium: The Development Trend of New Trade Theory.

Orji-Okoro Izuchukwu, Doctorate Student: School of Economics, Wuhan University of Technology, P.R. China. Research: (10th International Strategic Management Conference) Employee's Perception of Change Effect as a Competitive Advantage on Nigeria Banking Industry: An Empirical Analysis. *Asian Economic and Financial Review: Why South-South FDI is booming: Case study of China FDI in Nigeria. 10th International Strategic Management Conference: Employee's perception of change effect as a competitive advantage on Nigerian Banking industry: AN empirical analysis*