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Platform Technologies and Socio-economic Development: The Case of Information and Communications Technologies (ICTs) in Nigeria

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Abstract

As Nigeria evolves towards an emerging economy, Information and Communications Technologies (ICTs) portend as a possible avenue through which she can improve her global competitiveness, if she must meet her target of becoming one of the world's 20 biggest economies by the year 2020. ICTs have redefined human existence in recent times, with profound effects on socio-economic, political and cultural aspects of society and have become indispensable tools in the implementation of national development plans. Thus, this paper uses secondary data to analyse the state of ICTs in Nigeria during the period 2001-2009, highlighting their contributions to gross domestic product (GDP), level of employment generation and poverty reduction, and the overall contributions to the country's socio-economic development. The paper concludes with an advocacy for Nigeria to invest in other platform technologies, such as biotechnology and nanotechnology so as to move the country towards technological advancement, and ultimately attain her 'Vision 20:20:20' agenda.

Keywords: ICTs – ICT Adoption – Platform Technologies – Science, Technology and Innovation – Socio-economic Development – Nigeria

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Introduction

Nigeria is dramatically evolving towards an emerging economy and she is desirous of becoming one of the World's twenty biggest economies by 2020. Nigeria has encapsulated that desire into a strategic vision tagged 'Vision 20:20:20' (Federal Republic of Nigeria 2005). This vision is seen in certain circles as the latest socio-economic development blueprint of the country. The vision promises improvements in all-round development in the most critical sectors of the economy. The vision is also laden with the intent to reduce the burden of poverty on the populace and to massively roll out infrastructure in large magnitudes. For instance, the availability of infrastructure is the *sine qua non* for any sustainable development in the socio-economic planning of any society (Adepelin 2009). Similarly, a sound provision of public goods and services is a set of indispensable preconditions: road and rail transport, ports, energy and communications infrastructure among others raise the productive potential of firms and people (The Smith Institute 2005).

Nigeria's projection perhaps, is neither undue optimism nor an over-ambitious target when viewed upon the backdrop of the country being Africa's most populous country (a fifth of Sub-Saharan Africa) with an estimated population of over 140 million people and richly endowed with vast mineral resources. However, as promising as the vision seems, without commensurate investments in science and technology and the adoption of appropriate technologies to drive that vision, it might as well go the way of previous development plans initiated by the country since independence in 1960.

The above argument is predicated upon the critical role science and technology play in socio-economic development of nations, more so, for their competitiveness in a global context, a position reinforced by many development experts, scholars, and international development agencies (IDCs) (Balioune-Lutz 2003; Castells 1999; Farley 2005; Feinson 2003; Juma 2007b; The Smith Institute 2005; United Nations (UN) Millennium Project 2005). As people search for more and better ways to organize themselves to improve their socio-economic status, access to technology increasingly determines their success (The Smith Institute 2005), and with that same understanding that science, technology and innovation have a vital role to play in boosting Africa's socio-economic development, the eighth African Union (AU) Summit of heads of state and governments was convened in Addis Ababa, Ethiopia (Juma 2007a).

As there is an observable global shift from an industrial to technological and then to knowledge- and information-based economies, driven by revolutionary developments in communication and information technology (Imparato & Harari 1996 as cited in Khota & Pretorius 2008), this paper focuses on ICT, as according to the President of the International Telecommunications Union (ITU):

In today's world, information and communication technologies (ICT) have a profound effect on most socio-economic, political and cultural aspects of society; they have become indispensable tools in the implementation of national development plans in many countries, supporting their efforts to secure the welfare and prosperity of their citizens (ITU 2010).

Thus, this paper explores the achievements recorded so far by Nigeria in adopting ICTs, and in specific terms, ICTs' contributions to socio-economic development of the country for the period 2001 – 2009. The paper also advocates for the extension of the same feat to other platform technologies like biotechnology, nanotechnology, clean energy technologies, etcetera, to enable Nigeria to join the league of the twenty biggest economies of the world come 2020.

Literature Review

Arguments for Science, Technology and Innovation in Development

In writing the foreword to *Going for Growth: Science, Technology and Innovation in Africa* for The Smith Institute, the Rt Hon Gordon Brown, listed the foundations of economic growth as sustained investment, innovation, education, skills, science and technology (The Smith Institute 2005). Similarly, according to Farley (2005), it has become widely acknowledged that science and technology play an instrumental role in the reduction of poverty, improvement of competitiveness, and delivering results in key sectors – education, agriculture, information and communication, transportation, biotechnology among others. He further maintained that the importance of science and technology, including knowledge for development cannot be understated, as they are undeniably fundamental to the wealth and health of individuals. The UN Millennium Project (2005) asserts that the long-term driving force for modern economic growth has been science-based technological advance. In support of this, Feinson (2003) stated that many development scholars have equally argued that successful economic and industrial development is intimately linked to a nation's capacity to acquire, absorb and disseminate modern technologies. In corroboration of Farley (2005), Feinson (2003) and the UN Millennium Project's (2005) statements, Castells (1999) went a step further to maintain that social development today is determined by the ability to establish a synergistic interaction between technological innovation and human values. This leads to a new set of organizations and institutions that create positive feedback loops between productivity, flexibility, solidarity, safety, participation and accountability, in a new model of development that could be socially and environmentally sustainable. Therefore, countries' science, technology and innovation policies are designed to stimulate steady growth in gross domestic product (GDP), advance the quality of life for their citizens, improve skills and knowledge among the population, and so on.

However, Farley (2005) acknowledged that global disparities in science, technology, and knowledge for development capacity are acute. He maintained that differences in growth due to the distribution, use, adoption, adaptation, and generation of knowledge are widening and that forces of globalization, rapidly changing technology, and the increasing importance of knowledge have raised the cost of having low capacity in science, technology, and knowledge for development capacity in developing countries. Further, in Africa's case, access to technology is limited and knowledge institutions are weak and therefore he called for explicit efforts to increase technology flows (Farley 2005). This scenario is also acute in Nigeria. In response to that call, a spectrum of pervasive technology platforms must be identified as candidates for adoption if the country and other developing nations must improve the socio-economic status of their citizens through science, technology and innovation. Such platform (generic) technologies that have broad applications for or impacts on the economy include ICT, biotechnology, nanotechnology, and new materials (UN Millennium Project 2005).

Undeniably, ICTs offer a new channel for economic growth which may allow developing countries to catch the development train faster and perhaps ensure a more sustainable ride.

However, Balamoune-Lutz (2003) once said, technology per se does not solve social problems but rather its availability and use. Likewise, ICT as a technology on its own will not be able to solve social problems, but its availability and wide application in society is the prerequisite for economic and social development in our world (Castells, 1999). Once more, ICTs are helping to integrate diverse economic fields in new ways and have consequently been seen as generic tools that underpin most other economic sectors (Juma 2007b).

Nevertheless, technology transfer tends to focus on the producer of the technology while much of the focus of diffusion relates to the end user of the technology. As such, viewing the issue from a holistic perspective of technology development and utilization, these two areas are closely interrelated and must be considered together (Ahmed 2005). Chinn and Fairlie (2006) argue that rates of technology use differ markedly across countries. Perhaps this explains Castells' (1999) assertion that there is marked divide in the use of ICT between the industrialised world and the poor countries. Diffusion of ICT is extremely uneven, with most of Africa and many other regions of the world being left in a technological apartheid (Castells 1999). Even amongst developing nations there are still clear distinctions (Balamoune-Lutz 2003) a phenomenon which is often derogatorily referred to as the 'global digital divide'.

ICT in Socio-economic Development

ICT is one platform technology amongst a range of technologies that has redefined human activities in phenomenal ways. Oyekanmi (2005) stated that the relevance of ICT to the development of individuals, organizations, nations and the entire world cannot be over emphasized, for the world today is shaped by advancements in the field of ICT. Indeed, the contributions of ICTs to socio-economic development have been highlighted by very many researchers and development experts alike. Details of the role played by ICT in a global context can be found elsewhere in the UN Millennium Project (2005). For instance, the United Nations Development Programme (UNDP) has this to say:

...information communication technology is perhaps the central development issue at the dawn of the new millennium. Not only are the technologies the key to economic growth, they can impact on most pressing global issues (UNDP 2001).

Thus, the United Nations' (UN 2003) made the following declaration on information:

We (----) declare our common desire and commitment to build a people-centred, inclusive and development-oriented information society, where everyone can create, access and share information and knowledge, enabling individuals, communities and peoples to achieve their full potential in promoting sustainable development and improving their quality of life (UN 2003)

The rapid diffusion of mobile phone communications in Africa, Asia and Latin America has had an impact on economic development and on the lives of millions of people who never before had access to a reliable telecommunications tool (United Nations Conference on Trade and Development (UNCTAD) 2008). Some observers according to Stiroh (2002) have raised the possibility that production spill-overs and network effects associated with ICT are an important part of today's knowledge-based economy. Much as ICT is seen to have contributed to the economic growth in the United States (US). In the same vein, the global economy has been driven by a greater integration of world markets and a spectacular growth of ICTs (Balamoune-Lutz 2003).

The 10th Meeting of the African Partnership Forum (APF) in Tokyo, Japan (APF/Tokyo 2008) ascertained that:

ICT contribute to economic growth through: increasing productivity across all sectors; facilitating market expansion beyond borders to harvest economies of scale; lowering costs of and facilitating access to services, notably in administration, education, health and banking; providing access to research; development of ICT products and services; contributing to better governance, a prerequisite to growth, through increased participation, accountability and transparency (APF/Tokyo 2008)

Consequently, Africa is on the move and ICTs are a powerful tool to boost economic growth and poverty reduction (AFP/Tokyo 2008) by transforming the delivery of major services thereby helping contribute to economic growth (Juma 2007c). ICTs increase efficiency, provide access to new markets or services, create new opportunities for income generation and improving governance and give poor people a voice (AFP/Tokyo 2008). Hence, Mbambo and Cronje (2002), suggest that ICTs, and especially the Internet, should be used as a precise and effective tool in any process that facilitates development – not merely as an end in itself.

Nigeria has come to realise the fact that no modern economy can be sustained without integral ICT, as effective information and communication processes are a prerequisite for any economy and has therefore adopted the technology as a means to forward the growth of her economy (AFP/Tokyo 2008; Oyekanmi 2005).

Historical Development of ICT in Nigeria

In Nigeria, the ICT sector in times past was characterised by the following: -

- Government ownership of a monopoly telecommunications company
- Government funding of telecom infrastructure development
- Slow pace of network rollout
- Long waiting line for services
- Consumers limited to only one service provider
- Quality of service delivery low
- Weak infrastructure base
- Huge unmet demand
- Lines concentrated mostly in selected urban centres, and
- Limited investment into the sector (Ndukwe 2005)

The above situation occurred before the deregulation of the country's telecom sector in late 2001.

Given the scenario described above, several countries, in the last two decades of the 20th century, identified that liberalisation of telecommunications market was essential for rapid network growth and that private sector participation was essential for attracting financial resources, innovation and new technology. Nigeria thus embraced Market Liberalisation to accelerate ICT growth (Ndukwe 2005). The Regulatory body, the Nigerian Communications Commission (NCC), was established by law in November, 1992.

- Commenced operation in mid 1993 with the inauguration of the first Commission
- Commenced full market liberalisation and Sector Reform in 2000 (Ndukwe 2005)
- In order to economically exploit ICTs, the NCC declared 2007 as the year of the Broadband

The deregulation thus ushered in a notable increase in private sector involvement in the Nigerian Telecommunications Industry. Thus with the release of the National Telecom Policy (NTP) in September 2000, a successful auctioning of the 2G Digital Mobile Licenses occurred in January 2001 (a total of four Global System for Mobile Communications (GSM) licenses issued), the licensing of Fixed Wireless Access (FWA) Operators in 2002, (both national & regional licenses issued), and a second National carrier was licensed in 2002 (Ndukwe 2005). This effectively broke the monopoly enjoyed by the State owned Nigerian Telecommunications Limited (NITEL).

In 2007, Ndukwe reported that while China estimated a mobile phone subscription rate of 500 million and India was adding 6 million new subscribers every month, in Nigeria, the monthly subscriber growth rate was approaching 1 million per month. Nigeria – with a fifth of Sub-Sahara's population – has been one of the slumbering giants of the African Internet world, which until mid 1998 had only a few dialup email providers and a couple of full Internet Service Providers (ISPs) operating on slow links. Very few Nigerian citizens were able to afford the \$130,000 a year for an international 9.6Kbps leased line (African Information Society Initiative (AIS) 2000).

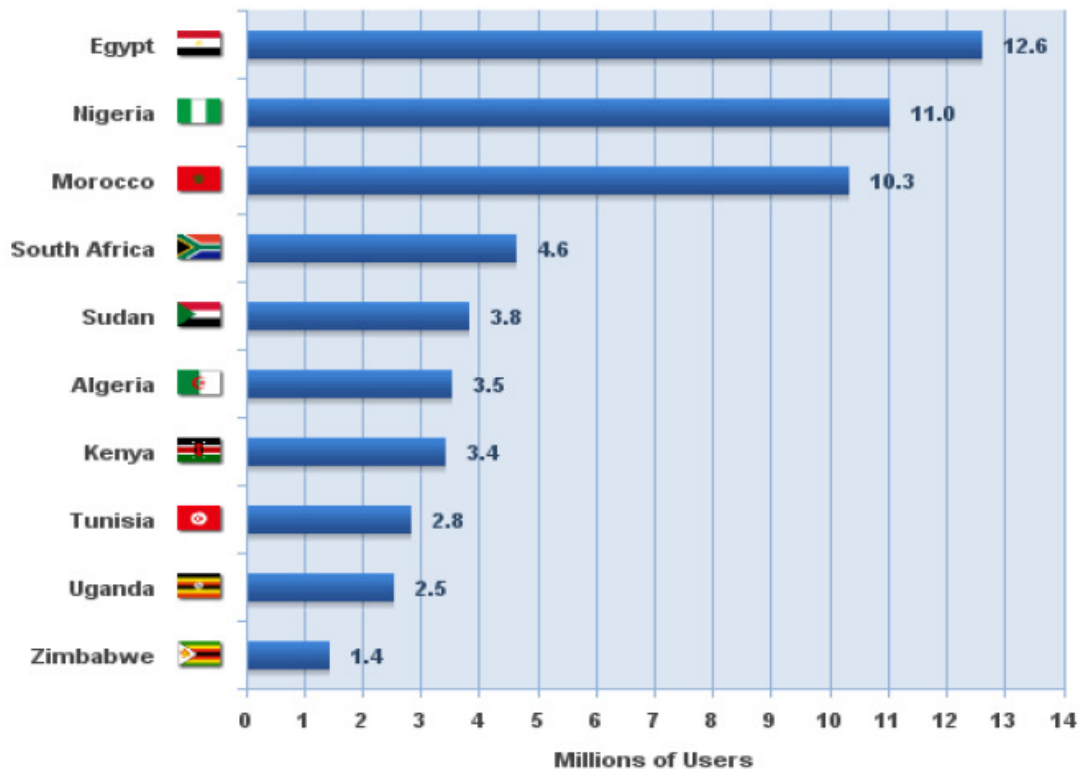


Figure 1: Africa Top Ten Internet Countries June, 2009

[Source: Internet World Stats 2009]

The transformation of Nigeria's telecommunications landscape since the licensing of three GSM networks in 2001 and a fourth one in 2002 has been nothing short of astounding. The country continues to be one of the fastest growing markets in Africa with triple-digit growth rates almost every single year since 2001 (Internet World Stats 2009). At the last count, more than 400 ISPs have been licensed as well as a number of data carriers, Internet

exchange and gateway operators. Nigeria is the most competitive fixed-line market in Africa, featuring a second national operator (SNO) and over 50 other companies licensed to provide fixed telephony services, surpassing Egypt and Morocco in 2004 to become the continent's second largest mobile market after South Africa (Internet World Stats 2009). Interestingly too, from an obscure position in the past in terms of Internet usage, coming nowhere near the top 200 Internet countries in Africa, as at June 30 2009, Nigeria is second to Egypt (see Figure 1) with about 11 million Internet users (Internet World Stats 2009).

In Nigeria, awareness of the Internet is still in its infancy and prospects for growth are high when one compares the size of the huge population to current Internet usage. Besides the increasing level of Internet use, Nigeria has also achieved about 80% phone penetration across its huge population centres with over 10,000 km of fibre optic links laid across the country (IT News 2008). The country recorded a steady mobile cellular subscriber growth rate from the inception of GSM until she occupied the number one position in Africa and the rest of the world in 2004 (NCC 2005)

The main ICT indicators in the country include cellular mobile, NigComSat1, fixed landline/ fixed wireless telephony, and the number of telephone users, defined as tele-density. Nigeria's tele-density grew from a lowly 0.73% in 2001 to 36.87% by end of quarter two in 2008, and 63.11% by December, 2010 (NCC 2011). Other indicators include Internet connectivity, number of PCs per 100 persons and so on (NCC 2008). The country had one of the world's least tele-densities but reached approximately 24% in 2007 and a high of 42% by the end of 2009 with over 83 million subscribers (NCC 2008, 2010; See Figure 2).

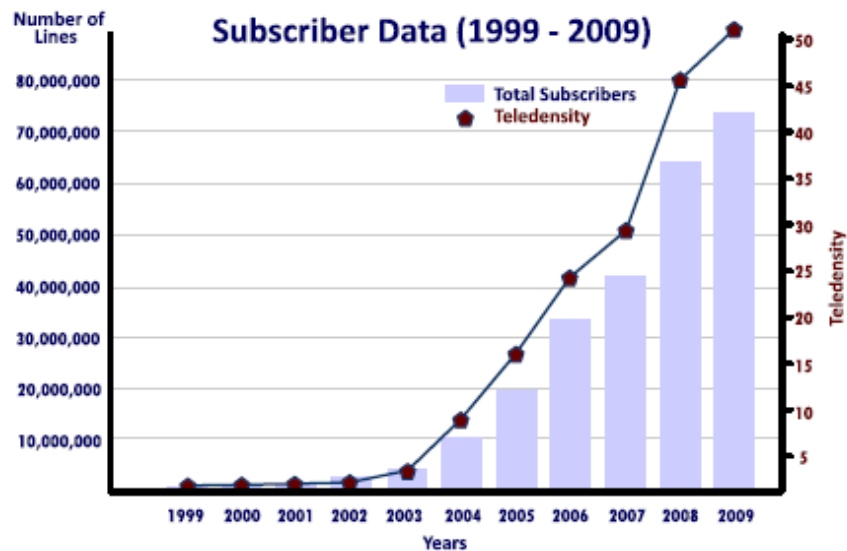


Figure: 2. Nigeria Telephone Subscriber Data (1999 -2009)

[Source: NCC 2010]

Despite the challenges of unstable electricity, lack of robust transportation infrastructure, fraud, acts of vandalism and hostilities in some parts of the country, interconnectivity, effective competition, monitoring, compliance and enforcement, consumer education and managing consumer expectations, institutional strengthening (Ndukwe 2005), with just

700,000 lines in 1999 to over 83 million connected subscribers by the end of quarter two in 2009 (NCC, 2010). Nigeria has recorded one of the fastest ICT growth rate in the world, and certainly ICT infrastructure is now firmly established in the country.

Another major milestone achieved in the industry was the launching of the first African communication satellite (NigComSat1), in April 2007. The State Accelerated Broadband Initiative (SAB1) and the National Rural Telephony Programme (NRTP) are also among the various government efforts to make ICT accessible to all in Nigeria (Vanguard News Online 2008).

Among other advancements, Nigeria intends to use NigComSat1 to create 150,000 jobs, save the country hundreds of millions of dollars a year, provide Internet access to remote rural areas, and to specifically help tele-education (educational television and e-learning) designed to facilitate the country's distance learning initiative (Agyeman 2007). Although NigComSat1 is currently experiencing certain technical difficulties, in the future it is expected to redefine the telecommunications architecture. This will be achieved through government initiatives aimed to make telecommunications affordable and accessible for even the remotest of villages in the country, through the use of the satellite for wireless satellite telephony and Internet connectivity.

In summary, since the establishment of democracy in Nigeria in 1999 and with a series of appropriate policies in place, the telecommunications sector of the economy has seen tremendous improvements, especially in regards to deregulation of the sector. All such initiatives have been aimed at making the sector one of the most vibrant in the African continent.

Methodology

This is a conceptual paper. It details the results of an exploratory case study method which was used to investigate the data. Case studies are an appropriate approach to use in explorative research especially when complex processes are to be understood (Yin 1984). The current study uses secondary data from extant literature and other public repositories as suggested by Cooper and Schindler (2003), to ascertain the extent of ICT diffusion into Nigeria's economy. It also investigates the contributions of ICT to the socio-economic development of Nigeria within the period under review. Secondary data was generally gathered by way of an elaborate literature search on related topics from text books, journals, conference papers, seminars/symposia and other reports.

The research design was largely defined by its investigative nature and above all, the researcher used qualitative inductive reasoning to draw inferences for this work, a position supported by many other researchers (Cooper & Schindler 2003; Page & Meyer 2000; Saunders, Lewis & Thornhill 1997).

Contributions of ICTs to Nigeria's Economy

This section takes a critical look at information and communications technologies in Nigeria from a socio-economic development perspective. The section details the socio-economic impact of ICTs on the country for the period between 2001 and 2009.

In trying to achieve 'Vision 20:20:20', Nigeria has made monumental strides in several spheres of human endeavour, by strategically positioning herself first, to take the lead in Africa. The sector that is most noticeable in this regard is the ICT sector. Perhaps it was the realization of the fact that access to ICT held the 'ace card' to the nation's ability to respond to the demands of its position in the "New World Order". Above all, access to modern

telecommunications services should necessarily be within easy reach of every person that lives within the shores of Nigeria (IT News 2008). Therefore, the government of Nigeria embarked on a rigorous deregulation of the ICT sub-sector of the economy.

Modern Ghana News (2008) quoted the Secretary General of the ITU, Dr. Hamadoun Toure, when he addressed an investors' forum at the ITU Africa Group in Cairo, Egypt, as saying that "the Nigerian economy has best been described as the best growing market for telecommunications in the continent (Africa) in spite of the numerous challenges facing it, ranging from strikes, corruption and security". As reported by Ndukwe (2004), the economic benefits accruing to Nigeria from ICT include, but are not limited to, attracting new investments and providing much-needed infrastructure and the creation of innovative services. Investment in telecommunications tends to trigger an economic chain reaction which, in Nigeria, has positively impacted other sectors of the economy.

According to Oyekanmi (2005) World Bank studies indicate that for every US\$1 invested in telecommunications infrastructure, more than US\$6 is generated in economic returns, by its flow-on impact on local employment and general economic growth. In Nigeria, this has been seen with the development of the GSM service, which has not only created many job opportunities for jobless people, but has translated to profits of phone business centres which have had a flow-on effect on the wellbeing of the household (Ndukwe, 2007). Cyber cafés as well, are creating great opportunities for young people to be employed and at the same time exploit the advantages of the Internet.

According to the African Development Bank (AfDB 2009) the Nigerian Telecoms sector attracted \$12 billion in seven years. The then Minister of State for Information and Communications, Ibrahim Nakande also affirmed that, since the liberalisation of the telecom sector and the advent of GSM in Nigeria, Direct Foreign Investment (DFI) of over \$12 billion had flowed into the country. Further, Nigeria had been able to generate over \$2.6 billion in licensing fees alone, excluding tax revenue cumulatively. The Minister added that these have direct bearing on the large number of franchised telecom dealers nationwide and the creation of over 12,000 direct employment as well as an estimated indirect employment of over half a million nationwide; in effect a new class of entrepreneurs who might otherwise have been unemployed, in the form of a network of dealers, vendors, sellers of GSM accessories and the ubiquitous "umbrella-stand" operators (Ndukwe 2008; Vanguard News Online 2008). See Figure 3.

AfricanLoft (2008) also confirms the position of the Minister, that with respect to employment, over half a million persons have been directly and indirectly employed by the operators and their distribution chain components, while industry support service sectors such as banking, insurance, consultancies (legal, accounting, human resource, tax), haulage, shipping and IT, as well as the Small and Medium Scale Enterprises (SME) segment of the economy have also witnessed very significant levels of increased activity.

At the macroeconomic level, the contribution of ICTs to GDP increased by 27.8 percent from N6.7 billion in 2004 to N8.6 billion in 2005, making it the third highest contributor ahead of the financial sector, which has been in operation for over 100 years (AfricanLoft 2008). Although the sector is said to be contributing a minimum of 3% to Nigeria's GDP (Dozie 2009), by May 2010, ICT are mooted to have accounted for 1.62 per cent of GDP, with over 50.90 per cent growth in contribution to GDP (Fekiyesi 2010).

In another light, the emergence of digital mobile services and other ICT related technologies have led to improvements in efficiency and productivity, a reduction in transaction costs, increased service innovation and better quality of life (Ndukwe 2008). ICT is seen to have successfully aided the following sectors of the Nigerian economy: the Industrial/

Manufacturing, Education, Transportation, Tourism, Health, Banking, Commerce, Agriculture, Government Services, Defence, Sports, and Rural Development. ICTs played a vital role in the enumeration of the 2006 population census in Nigeria, and the successful hosting of the 15th National Sports Festival in 2006 (Posu 2006).



Figure: 3. One of the popular umbrella stand operators

ICT also played a role in both the 2003 and 2007 National elections especially during the voter registration exercise, while the e-voting option is contemplated for subsequent elections. The aviation industry has equally been impacted by the vibrant ICT sector, as digital equipment has replaced most of the obsolete analogue apparatus at the nation's airports. Furthermore, e-booking/ticketing as well e-clearance for boarding has also been adopted by airline operators. In specific terms, the manufacturing sector recorded an enhancement of their profit level since the adoption of ICT, as a result of significant savings in the cost of ordering raw materials and other inputs. This was mainly due to the implementation of technologies which almost completely removed the manual processes of ordering inputs, design and inventorying, as well as sales (Kajogbola 2004).

Similarly, the services sector shared the same experience as the manufacturing sector, with profitability-enhancing factors contributing as much as 55% on average per year (Kajogbola 2004).

The success story would not be complete without a mention of the banking sector when talking about the effects of ICT on Nigeria's economy. To say that the banking sector is the greatest beneficiary of the ICT industry in Nigeria is merely stating the obvious. The ICT platform in the country effectively set the stage for a post-consolidated globalised banking sector that today is set to take its lead in Africa.

Agboola (2004) affirmed that the banking industry in Nigeria witnessed tremendous changes linked with the developments in ICT over recent years and that the quest for survival, global relevance, maintenance of existing market share and sustainable development has made

exploitation of the many advantages of ICT through the use of automated devices imperative in the industry.

Some of the ICT associated technologies implemented in the banking sector are as follows:

- Bankers Automated Clearing Services: This involves the use of Magnetic Ink Character Reader (MICR) for cheque processing. It is capable of encoding, reading and sorting cheques
- Automated Payment Systems: Devices used include Automatic Teller Machines (ATM), Plastic Cards and Electronic Funds Transfer
- Automated Delivery Channels: These include interactive television and the Internet (Agboola 2004)

Others include automated accounting systems, information management systems and e-banking and cell phone banking

The adoption of such a range of ICTs has influenced the content and quality of banking operations and from all indications, ICT presents great potential for business process reengineering of Nigerian Banks, which has already resulted in speedy, convenient and accurate services to customers (Agboola 2004).

Daily activities such as shopping, entertainment, banking, manufacturing, office work, education, medical care, governance and even commuting have become increasingly dependent on information and communications networks in recent times (IT News 2008).

Finally, from all indications, the economic impact made in the ICT sub-sector, within its relatively short existence, has been tremendous and this has encouraged a healthy range of telecom activities across the country. It is serving as the backbone for other industries and almost every aspect of the national economy (Okafor 2007). However, the inadequacy of broadband services (Internet provisions are still insufficient) is one of the challenges confronting the ICT sector in Nigeria (Onyekwere 2009).

However, despite all the benefits drivable from the increased development of the ICT sector, as Fekiyesi (2010) has noted: "the benefits are far behind in terms of services". For instance, there are still the challenges of unstable electricity and other related infrastructure issues, poor inter-connectivity, frequent dropped calls, slow Internet speed, as well as non-availability of services in rural areas. Part of the downside of the ICT explosion in Nigeria is the increase in the prevalence of Internet related crimes (cyber-crimes), credit card fraud, ATM card fraud and advance fee fraud, popularly known as '419' in Nigeria. This implies that, for Nigeria to drive maximum benefits from the ICT sector as outlined in this paper, the country also needs to tackle the challenges as well.

Conclusion

This paper clearly reveals how the wide-scale, adoption, adaptation and application of platform technologies can enhance socio-economic transformation of citizenry and the enhancement of global competitiveness of a nation. With the changes that Nigeria has made thus far, it presents itself today as an attractive proposition for investors in the ICT sector. With ICT becoming the third largest contributor to Nigeria's GDP as well as the largest provider of employment – second only to government – coupled with general improvements in the living standards of the people, Nigeria's socio-economic development has indeed improved remarkably since the liberalisation of and subsequent massive investments in the telecoms industry in the country.

It is therefore recommended that, if Nigeria is to achieve her Vision 20:20:20 set objectives, as a matter of necessity she must invest in other platform technologies to the same scale she has invested in ICT. In doing so, one may be quick to suggest that the country considers biotechnology as the next platform to pursue, since Nigeria is blessed with rich bio-resources and biodiversity, and has a reasonable level of manpower resources available in the sector. Barcena (2009) has recommended that the new techno-economic paradigms such as ICTs, biotechnology and nanotechnology, and the emergence and spread of these new paradigms, be considered as a necessary strategic starting point to rethink development policies for the 21st century.

Again, in order to drive maximum benefits from ICT and other such generic technologies so advocated, Nigeria will have to tackle the challenges of poor science and technology infrastructure and the other downsides of the ICT industry as mentioned earlier. By beginning to reinstate them in this paper, the researcher wishes to bring to the fore the role platform technologies play in providing windows of opportunities to developing countries to, not only tackle their multi-faceted development challenges, but also to improve their development outcomes, with profound results.

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