



## Information and Communications Technology (ICT): A Panacea to the Nigerian Economic Growth and Development Up to 2022

Audu, Jamiu Kolawole<sup>a</sup> and Akinade, Edith Abidem<sup>b</sup>

### Abstract

Several countries including Nigeria see the utilization of Information and Communications Technology (ICT) as source of economic development and tools that facilitate communication, processing and transmission of information by electronic means. ICT is a driver of economic development and an indispensable tool for global development. Among the interests and vision of Nigeria for 2020 is to make the country become one of the leading 20 global economies. This can only be realized through the transfusion of innovation in modern technology and industrialization into virtually all sectors of the country's economy. Thus, this paper exploits the growth benefits of ICT and its contributions to the Nigerian economy, as well as other developing countries of the world. The growth rate of ICT among other factors has been seen as the engine that drives the economic development of Nigeria. ICT services are helping in various sectors such as health, education, communication, agriculture and power. This paper also discusses the major constraints and challenges facing the effective utilization of ICT in the development of various sectors which among others include incessant power failure and poor exploitation of ICT resources in educating the masses on health and economic issues. Recommendations are made on the improvement of the application of ICT.

**Keywords: Information, Technology, Development, Economic Development**

### Introduction

It is the wish of Nigeria's government to place the country among the leading global economies through vision 2020. This can only be realized if the Nigerian government can effectively integrate Information and Communication Technology (ICT) and technology transfusion through innovation in modern technology and industrialization into virtually all sectors of the country's economy. ICT as an acronym for Information and Communication Technology has become a prominent tool that had revolutionized our perception of the world and how we live, it features the use of computer systems, internet services, telecommunication facilities and other related technologies in every aspect of human endeavour Ajayi, & Ekundayo, (2009). Aharony & Shonfeld. (2015:195), examined that, "presently, the global economies depend heavily on the use of ICT to

<sup>a</sup> Department of History and Diplomatic Studies, Tai Solarin University of Education, Ijagun, Ogun State.  
[audujk2015@gmail.com](mailto:audujk2015@gmail.com)

<sup>b</sup> PhD. Department of Education, National Teachers' Institutes Kaduna LASPOTECH Ikorodu, Lagos.  
[edithakinade@gmail.com](mailto:edithakinade@gmail.com)



*speed up the level of their economic development and also to improve the standard of living of citizenry within their respective countries.”*

Information and communication technologies are rapidly changing the world by the way citizens communicate, and interact not only with one another but also with private businesses, public service utilities and government institutions. It is believed that information Technology relives part of our life by playing a significant role (Nunn & Quinet, 2002). In the past, people went about performing different forms of business such as applications for the renewal of passports and licenses, acquiring more knowledge, and paying school fees, certificates, transcripts, registration, payment of utility bills, etc, traditionally and manually. Today with the use of ICT it is possible for the same interactions to take place without going out of our various offices and at service centres with internet facilities. Bryan, Tsagarousianou & Tambani (1998) affirmed that these Technologies have brought a significant change in the perception, attitude and way of thinking of its users. It is believed that information technologies relieve many parts of our life by playing significant roles (Nunn & Quincy (2002). There is no doubt that information and communication technology has found its niche in every sphere of Nigeria’s polity. It has been defined as “a broad-based technology (Including its methods, management and applications) that supports the creation, storage, manipulation and communication of information and has helped in national development across the globe by changing the way and manners people live and work (French, 1996). Ssewenyan and Busule (2007) stated that it links the world together by networking people to interact with each other in real time without travelling from one end of the world to the other.

Education in faraway places is brought closer to people in their homes, offices and places where there is the availability of internet access. In an article written by Okwonu (2010) on the eradication of poverty; he affirmed that without the proper use of ICT, poverty eradication cannot be achieved in the country. He shed light that ICT in poverty eradication over the years has been very slow to bring forth fruitful development due to the high rate of poverty and how it has a huge effect on the quality of people’s lives in Africa. He stated further that the presence of ICT has contributed to the economic development of Nigeria. ICT plays a very important role in the education sector by enhancing knowledge and skills through access to information. Education has been deduced as an important factor for development. Education determines the state of prosperity, sustenance of welfare and security of the people. Education enables skills development as this allows individuals to live and contribute meaningfully to the complete development of the society in which they live. However, ICT has been recognized as the engine for growth and a source of energy for the social and economic empowerment of any country, especially a third-world country. These countries are empowering masses through IT as it can prove to be an effective shortcut to higher levels of equity in the emerging Global Digital Networked Information Economy.

Technological innovation has improved in Nigeria recently. For example, Nigeria’s digital mobile network has grown significantly since the three companies awarded the Global System for Mobile Communications (GSM) operating licenses were issued in January 2001, while their operations commenced in August of the same year. Mobile cellular services made their debut on the Nigerian market in 1993 with a “National” service operated by NITEL and a smaller Lagos service operated by Mobile Telecommunication Services (MTS). The two companies, with a joint subscriber base of 12,500 offer voice services over an analogue network, as well as value-added services such as voicemail, and paging, from three switches (in Lagos, Enugu, and Abuja). In 1995, MTS closed its operations due to failure to pay interconnection charges to NITEL. Over the past



few years, Nigeria has had the fastest-growing telephone subscription in Africa and is among the World's most populous nations. ICT offers the promise of fundamentally changing the lives of much of the world's population. In its various forms, ICT affects many of the processes of government and businesses, how individuals live, work and interact, and the quality of the natural and built environment. The development of internationally comparable ICT statistics is essential for the government to be able to adequately design, implement, monitor and evaluate ICT policies (Adueme, 2010). ICT has now been accepted as one of the main driving forces behind organizational competitiveness in the present-day business environment. Presently, ICT is having a dramatic influence on almost all areas of human activities and one of the areas of economic activities in which this influence is most manifest is the banking sector.

The banking industry is one of the critical sectors of the economy which makes an invaluable contribution to the pace of economic growth and development of the nation (Ajayi, 2003; Madueme, 2010) Most developing nations including Nigeria have embarked on different reforms that foster the use of ICTs in their economies. These reforms tend to yield minimal benefits to economic growth and development, especially when compared with the developed countries of the world.

Economic advancement is known to impact fast economic development. In Nigeria policy on the adoption of information and communication Technologies was initiated in 1999, when the civilian regime came into power. The operation of the licensed telecommunication service providers in the country has created some well-felt macro policies. In conclusion, the positive effects of ICT and technology on Nigeria's assessed economic development such as increased productivity, efficiency and competitiveness of the Nigerian economy are achieved through innovation in modern technology and industrialization Sectors.

### **Impact of ICT on Nigeria's Economic Development**

The importance of ICT to different sectors of the national and economic life of the nation cannot be over-emphasized. The various benefits of ICT to these sectors and how the user has been contributing to national economic development are discussed under this segment. In every sector, ICTs are powerful tools for controlling corruption. ICTs enhances transparency particularly at the transactional level, while offering opportunities for easier access to public records, and establishing linkages among geographically separated systems for better accountability. It enhances transparency particularly at the transactional level, while offering opportunities for easier access to public records, and establishing linkages among geographically separated systems for better accountability.

It also promotes transparency particularly at the transactional level, while offering opportunities for easier access to public records, and establishing linkages among geographically separated systems for better accountability and offers opportunities for easier access to public records, and establishing linkages among geographically separated systems for better accountability. Probably, the most common way of describing corruption is to use terms that express loathing and contempt for the process and all those involved in it. Evidently, the corrupt Officers in government have arrogance, greed and perhaps a sense of panic to lead them to eat like gluttons. They may expect that the masses will not notice or will forgive them, a bit of gluttony but they can hardly expect us not to care when their gluttony causes them to vomit all over our shoes. Availability of Electronic information in villages (Radio, Television, and handsets is one of our greatest breakthroughs) that provide networked access to official electronic services. These initiatives and



many more form parts of major government initiatives which use an easy level of ICT as far as possible. Although the voices of the villagers are not heard, it is a step closer to achieving an environment where ICT has contributed to minimizing the problem of corruption. Regardless of sector and level of transactions, corruption hampers development. It damages a country's development by undermining faith in public institutions, increasing costs for firms and can potentially scare away both foreign and inward investments. Onabanjo, Ajisegiri Oluwafemi (2010) While complete eradication of corruption is difficult to achieve, much can be done in decreasing its prevalence. Putting in place systemic hurdles may prevent people from abusing their power for private gain. In tandem with limiting opportunity, the perceived risks of detection may further reduce prevalence.

The provision of information and public services by electronic means through integrated systems has proven to be valuable in putting in place systemic hurdles and increasing the risk of detection. The use of ICT for faster communications, exchange of information, and improved recording and monitoring of information can greatly improve the operational efficiency of Government agencies. As the cost of doing business declines and becomes "predictable", business development and investment are stimulated, further expanding economic growth. While complete eradication of corruption is difficult to achieve, much can be done in decreasing its prevalence. Putting in place systemic hurdles may prevent people from abusing their power for private gain. In tandem with limiting opportunity, the perceived risks of detection may further reduce prevalence. The provision of information and public services by electronic means through integrated systems has proven to be valuable in putting in place systemic hurdles and increasing the risk of detection. The key to understanding how information and communications technologies can reduce corruption is to understand that ICTs are tools used in the context of broader programs of institutional reform.

### **ICT in the Health Sector**

Integrating the use of ICTs into existing health systems has helped to improve the delivery of health care in a number of ways (Rodriguez, 2000a, 2000b; Polanski 2001). World Health Organization affirms that the use of ICTs in health is not merely about technology, but a means to reach a series of desired outcomes, such as health workers making better treatment decisions; hospitals providing higher quality and safer care; people making informed choices about their own health; and people having better access to the information and knowledge they need for better health (Dzenowagis, 2005). According to the International Telecommunication Union (ITU, 2005), Telemedicine is a powerful tool for improving healthcare delivery that has been successfully implemented in pilot projects in many countries. Telemedicine involves the use of medical information transferred from one site to another through electronic communications, to improve patients' health care, including diagnoses and treatment. (WHO, 2007).

Although telemedicine can be highly effective, Greenberg, (2005) notes that cost is an issue: "in its high-tech implementations, it is unlikely to be cost-effective or affordable in widespread use. Used wisely, however, telemedicine can be a cost-effective method that richer countries can employ to aid capacity building in the health care systems of poorer countries. Johnson, Kennedy and Murdoch (2004). A study on the use of teleophthalmology found that the technology transfer was effective in World Educators Forum, Volume 6 No. 1, reducing the burden of eye disease and those practitioners in South Africa also learned novel procedures that could help future patients and improve cost-effectiveness. The use of teleconsultations has been assessed in



several specialities (Campenella & Hannifin, 2004). Laboratory, dermatology, and cyto-pathology telex consultations are not time-consuming and are reliable.

Studies have demonstrated the efficacy of telemedicine in health care delivery. For example, in rural areas, it has been used to improve maternal health (Martinez, 2005), and in urban areas ICT has been used to contribute to the prevention of mental health (Finque Lievich, 2000). Similarly, distance education has been used to encourage breastfeeding (Musoke, 2001). In fact, in Africa, most people are based in rural areas, and the people come to towns and cities for their health care in huge numbers and at enormous costs. ICTs are beginning to be used innovatively to bring health care to people in a more effective manner. Telemedicine is one way this can be done. In Bangladesh, a project was developed to reduce the burden of eye disease and practitioners in South Africa also learned novel procedures that could help future patients and improve cost-effectiveness. The use of Tele consultations has been assessed in a number of specialities (Campenella & Hannifin, 2004). Some, such as laboratory, dermatology, and cytopathology teleconsultations, are not time-consuming and are reliable. Studies have demonstrated the efficacy of telemedicine in health care delivery. For example, in rural areas, it has been used to improve maternal health (Martinez, 2005), and in urban areas ICT has been used to contribute to the prevention of mental health (Finque Lievich, 2000). Similarly, distance education has been used to encourage breastfeeding (Musoke, 2001). In fact, in Africa, most people are based in rural areas, and the people come to towns and cities for their health care in huge numbers and at enormous costs. ICTs are beginning to be used innovatively to bring health care to people in a more effective manner. Telemedicine is one way this can be done. Information and Communication Technology is so crucial to the information management business in recent times that librarians, information managers and health educators cannot afford to stay aloof in the use of ICTS.

### **ICT in the Education Sector**

The education sector is facing many challenges nowadays. We live in a world where frequent changes occur in all sectors. The biggest instance is the corona pandemic. Who knew that this could also happen? Covid-19 has changed the whole world. Due to the lockdown, everyone worked from home online. Students, educators, and all are working hard so that learning continues. This pandemic has brought a new model of learning, which is online for people. Today, from the time we sleep, we are surrounded by media like newspapers, radio, TV, and computers. So, getting tech-savvy and using information and communication tools is very important in changing society. If we use and adopt ICT in schools, our education system can prosper, and the country we become a knowledge superpower. The three challenges that people face in using ICT tools are:

- Access
- Equity
- Quality

Recently, schools are taking the benefits of ICT to deliver knowledge and information to children. ICT has become a core of the teaching-learning process. It has replaced the chalkboard with a whiteboard and implemented the usage of a digital smart board for teaching. When teachers become tech-savvy and properly train to use these tools, they deliver enhanced knowledge with high skills. Tools of technology like TV, radio, computer, the internet, and mobile phones all play an important part in our lives. People use ICT to stay connected and become adaptable to it. ICT is an



important part of our lives and has transformed them completely. According to Busler (2007), the four basic factors that are responsible for ICT in education are as follows:

**Social:** Technology plays an important role in our societies. Students need to be made aware of technology and strive to become tech-savvy.

**Vocational:** Many jobs nowadays are technology oriented.

**Catalytic:** using technology tools as a great way to enhance the teaching-learning process.

**Pedagogical:** technology and ICT tools as a great way to enhance learning, flexibility, and efficiency in the process of disseminating knowledge.

There are three ways in which ICT can be considered an important tool in education. These are as follows:

#### ***ICT Education***

ICT education means using trained personnel who can meet the needs and deliver information effectively to society. The vision is to train people and equip students with ICT skills and knowledge.

#### ***ICT-supported education***

It is also known as multimedia education. Around the world, many institutes and universities use ICT tools for printed study materials. It includes broadcast media, like radio, TV, audio-visual aids, etc.

#### ***Objectives of using ICT in Education***

The objectives of ICT in education include:

- Providing accessibility through the online medium of education.
- Improving the quality of teaching, especially in remote areas.
- To increase transparency in the education system.
- To strengthen the policies, rules, and laws in the education system.
- To analyze the learning and participation of the students and measure their effectiveness.
- Measuring and evaluating students' behaviour, involvement, and retention in the learning process.
- To analyze students' performance, placement, and application of knowledge.

#### ***The importance and role of ICT in education are as follows:***

##### ***Online learning***

ICT and its tools led to the emergence of online learning. Through this, the teachers and the students are learning innovative ways in the education process. Online learning has gained popularity amidst the corona pandemic to ensure that learning continues. ICTs have ensured that education reaches through it worldwide and even in remote areas. No matter where the students are, it has ensured that every learner derives its benefits.

##### ***Accessible to all***

ICT in education allows accessibility to all types of learners. All students can learn through the material provided. Even the special needs student can maximize the benefits through the usage of it. ICT has also covered issues like the "digital divide" and allows even less fortunate people to access the tools for their educational needs and enhance learning.



### **Roles of ICT in Agriculture**

Information and communication technology in agriculture (ICT in agriculture), also known as e-agriculture, is developing and applying innovative ways to ICTs in the rural domain, with a primary focus on agriculture. ICT in agriculture offers a wide range of solutions to some agricultural challenges. ICT farming, particularly the use of multimedia technology and other innovative approaches to interactive knowledge transfer processes, is transforming agricultural extension services. ICTs have been instrumental in empowering farmers through knowledge and building their capacity to achieve rural and agricultural developmental goals. Some of the key areas where ICT in agriculture plays a vital role are:

#### ***Regulatory Policy and Governance***

The widespread adoption of digital technologies by agriculturists is resulting in an exponential increase in the availability of a wide range of big data that can aid better policy-making and monitoring, as well as help transform the agriculture sector.

Agricultural extension and advisory services ICT in the form of innovative media platforms bridge the gap between farmers on one end and agricultural researchers and extension agents on the other. It is a more cost-efficient method to improve smallholders' knowledge of current agricultural practices and markets.

#### ***Enhanced Market Access***

ICT-enabled market information services enhance farmers' access to nearby markets and their awareness of current consumer demands through the transfer of information from the traders. ICTs also foster networking among agri-stakeholders, which facilitates increased market access for inputs and product marketing and trade.

#### ***Environmentally Sustainable Agriculture***

Budget-friendly mobile phones, internet, and other services to disseminate information, in addition to providing rural farmers with improved access to climate-smart solutions and the appropriate knowledge to use them

#### ***Early Warning System (EWS) for disaster management***

ICTs provide actionable and real-time information to governments and communities on disaster prevention and management. They also increase the efficiency of responding efforts during emergencies and drive more effective communication by providing people with timely advice on risk mitigation procedures.

#### ***Food safety & Traceability***

A combination of simple and sophisticated technologies, such as mobile phones, software solutions, RFID tags, data input websites, and sensors using GPS technology, among others, enable producers to capture and monitor reliable data and also comply with international traceability and food.

#### ***Advantage of ICT in E-agriculture***

1. It can initiate new agricultural and rural businesses such as e-commerce, real estate business for satellite offices, rural tourism, and virtual corporation of small-scale farms.
2. It can support policy-making and evaluation on optimal farm production, disaster management, agro-environmental resource management etc, using tools such as geographic information systems (GIS).
3. It can improve farm management and farming technologies through efficient farm management, risk management, effective information or knowledge transfer etc., realizing competitive and



- sustainable farming with safe products. IT-based decision support systems (DSS) can surely help their decisions.
4. It can provide systems and tools to secure food traceability and reliability which has been an emerging issue concerning farm products since serious contamination such as chicken flu was detected.
  5. It can facilitate rural activities and provide a more comfortable and safe rural life with equivalent services to those in the urban areas, such as the provision of distance education, telemedicine, remote public services, remote entertainment etc.
  6. Empowerment of stakeholders (Government Officials, Research, Education & Extension scientists, farmers and other service providers such as Community Information centres.
  7. Development of knowledge Management, Decision Support and Advisory systems to strengthen Extension services and also used for the farmers' redresser system.
  8. Efficient management (Development, conversation, allocation and utilization) of resources.
  9. Improved productivity and profitability of farmers through better advisory systems.

#### **ICT and Energy**

Consumers of public utilities frequently pay their usage fees, yet have their service disconnected anyway. At the utility office, there is inevitably no record of payment, and the receipt presented as proof of payment is discounted as fraudulent. Geographic information systems that incorporate third-party payment locations and mapping to confirm proper recording and account status are relatively easy to implement and can alleviate this kind of corruption. Consumers can visit public Internet access points, pulling up maps tied to geographic information system (GIS) databases showing their particular residence or place of business, colour-coded to indicate whether payment has been received (although there is a little extent to the use of this in Nigeria and the rest of Developing countries). Online payments using smartcards apart from our pay-as-you-go newly introduced by PHCN can appropriately be implemented in some countries where appropriate banking networks have been established. In the mining industry, excise taxes on mined ores and other commodities are frequently based on inspections at the mines. Frequently what is officially loaded on trucks at the mines does not match what gets transferred to ocean-going vessels at the port. Integrated computer systems linked by satellite can compare receipts and bills of lading, reducing corruption.

#### **ICT and Security**

For a nation to be in the phase of development there must be some prerequisites which include socio-political, and economic stability and security of the lives of citizens. Security is evidently the pillar upon which every meaningful development could be achieved and sustained. The developmental strides in most western capitalist states that place a premium on security lend credence to this assertion. However, this is not the situation in most developing countries: for example, in Nigeria, it is stated that whilst Nigeria is endowed with abundant resources, negligence to numerous challenges of insecurity of the environment appears to have created porous security conditions that engendered violence and retarded development (Nwanegbo and Odigbo, 2013).

Terrorism is fast becoming a current trend and problem facing various nations in the world, especially the developing ones: ISIS/ISIL, Boko-Haram, Al-Queeda and many more terrorist groups continue to wreck havoc in various nations making the environment an unsafe place to live. The impact of terrorism is far-reaching as it caused many to be destitute and homeless, increases





immigration flooding other countries which are far leading to overcrowding, the nuclear weapons being used are fast degrading the environment, and there is increased terror and panic around the world. Development cannot be achieved during incessant wars, the population is fast decreasing day by day due to incessant killings and this is a situation which is unbearable for the present generation, not to think of future generations. Information technology helps in reducing and curbing security disorder and achieves sustainable development through information technology devices. The use CCTV and highly developed scanning machines which are being placed in embassies nowadays and at borders of states and other strategic locations to detect suicide bombers and other people carrying harmful weapons can be used to detect terrorist actions.

Developed computer systems and robots can also be used by the armed forces in launching attacks against enemies and not just guns. Some computers can be used to fire missiles and other weapons at the enemies and also detect camps and weapons thereby reducing the need for so much manpower and conquering the enemy with not so much ado.

### **Fundamental Roles of ICT**

Unbound from the structures of the PTT days, ICT has become the foundation of every section of every economy in the world including Nigeria explicitly inferred that Information and communication technologies: (ICT) has been able to:

- Reduce transaction costs and thereby improve productivity.
- Offer immediate connectivity – voice data, visual- improving efficiency, transparency, and accuracy.
- Substitute for other, more expensive means of communicating and transacting, such as physical travel.
- Increase choice in the marketplace and provide access to otherwise unavailable goods and services.
- Widen the geographic scope of potential markets.
- Channel knowledge and information of all kinds.

There are known doubt that information and communication technology has found its niche in every sphere of Nigeria's polity. The ICT industry appears to be making significant inroads into Nigerian society. Before 1999, ICT resources and facilities were grossly limited in the country. Only very few wealthy Nigerians had access to these facilities and services. Internet facilities and services were rare to come by and the facsimile (ie. Fax) remained for a long time, the only means available to Nigerians for transmitting and receiving data or documents to other parts of the world. Public awareness of ICT and its application was low. Connectivity- whether the internet or mobile phones- is increasingly bringing market information, financial services, and health services- to remote areas, and is helping to change people's lives in unprecedented ways. New information and communications technologies (ICT), in particular high-speed internet, are changing the way companies do business, transforming public service delivery and democratizing innovation. With a 10 per cent increase in high-speed internet connection, economic growth increased by 1.3 per cent. The mobile platform is emerging as the single most powerful way to extend economic opportunities and key services to millions of people.

ICT provides economic opportunities to both urban and rural populations. One common contribution is that it increases productivity and makes the market work more efficiently, although the magnitude of the impact on economic growth is likely to be different. The fact that virtually all-



new mobile customers in the coming years will be in developing countries, and more specifically in rural areas, means that the ICT platform is reaching populations with low levels of income and literacy. As a result, ICT is becoming the largest distribution platform for providing public and private services to millions of people in rural and poor areas. Market information, financial services, education and health services had largely been unavailable in those areas in the past due to a lack of connectivity of any kind. Now the economic and social opportunities at all levels for the poor population.

The potential attributes and benefits of ICT to policymakers in society have been accepted as an imperative paradigm. ICT is the acclaimed engine room of modern-day global development and sustainable growth. In the same vein, no institution or organization can still rely only on traditional printed information resources to perform efficiently. The infusion of ICT into public administration enhances efficiency in the delivery of services to the people. ICT helps in taking high-quality decisions and at the same time saves time. It is in line with the laudable roles that the federal government of Nigeria in order to ensure the full exploitation of the potential of ICTs in sustainable democracy laid the foundation for e-government in Nigeria. Countries that have adopted and applied electronic services (ICT) to their operations have witnessed a dramatic improvement in their development efforts.

For countries such as Singapore, the United States, Canada, Japan and most European nations, ICT is a strong tool for sustainable development and improving governance, widening democratic space, increasing productivity, administrative effectiveness and cost-saving. It is not surprising therefore that the application of ICT in governance is engendering much concern in many countries of the world. The economic benefit of telecommunication is enormous, both as a growing industry in its own right and terms of its influence on economic development. Telecommunications is making the world a smaller place and creating a new information highway of high-speed electronic data exchange. The economic implications of ICT are far-reaching, mobile telephones, satellite television and automatic teller machines are just a few examples of how ICT is changing how people communicate.

Become informed or do business. ICT network is the basic facility through which the information needs of industry, commerce and agriculture can be satisfied. Industrial development requires the coordination of a series of operations. Including the acquisition of supplies, recruitment of labour, control, stocks, processing of materials, and delivery of goods to buyers, as well as billing and record keeping. Information and technology is vital to the effective development and control of many of these operations. Commerce is essentially an information processing activity; effective buying, selling and brokerage rely on the continual supply of up-to-date information regarding the availability of prices of goods and services. Farmers, on the other hand, must not only grow food but they must sell effectively and buy seeds and fertilizer. They also need information on weather conditions, disease outbreaks and new agricultural techniques. ICT policies in their economic and social development role are just catalysts meant to aid national development.

The benefits of ICT policies to a national economy should be measured as input to other economic activities. And more importantly, should also be considered complementary to other sectors. ICT development is linked with and complements the development of industry, trade, farming, education, housing, health and financial institutions. It is this complementary role that makes it appropriate to link ICT planning to national economic and social planning.



### ICT and Economic Growth

In this respect, policies that encourage economic growth and poverty alleviation are highlighted as sustainable policies. ICT development can lead to higher economic growth through an increase in productivity and a reduction in transaction cost (Nasab and Aghaei, 2009; Cheng et al., 2021). It can equally enhance financial development with favourable externalities on economic growth. These dimensions are however interlinked, making economic policies at times very difficult. For instance, ICT development increases CO<sub>2</sub> emissions and economic growth. An increase in CO<sub>2</sub> emission is harmful to health outcomes and reduces inclusive human development, boosts persistence in inequality and decreases human welfare as a whole. Recent theories have acknowledged the importance of technological progress for economic growth. The effect of ICT on growth can be enhanced. This could be through its enhancing effect on financial development and globalization. The significance of ICTs in economics and development resulted from the fast growth of these technologies and their market in the nineties. The world's developing countries started immensely to harness ICT for economic growth and sustainable development.

Recently, ICT is believed to foster sustainable long-term growth as a production technology through carefully designed ICT systems (Alani, 2012). The principal function of ICT is in enabling humans, governments and organizations to transform information into knowledge as a strong driver in evolving lasting change in the economy and society. The role of ICT in economic growth has a critical place in economic research; although ICT has become an active area for investment because of its dwindling cost of services and equipment most especially with the innovation of cloud computing and the investment into ICT which include computers and their peripherals, software, and telecommunications devices. Countries which comprise private and public-sector investors have invested in ICTs to improve their performance and to gain other benefits of ICTs thereby creating more jobs and information space for their citizens. It is pertinent to note that worldwide ICT spending is expected to exceed \$5.6T in 2021 (IDC, 2018) and the amount of money spent on information and communication technology research and development (R&D) in the United States is expected to reach 126 billion U.S. dollars and that of other countries (Germany, Russia, China, India etc.) cumulatively is expected to reach 228 billion US dollars (Statista, 2018).

The amount expended in the sector reflects the fact that the ICT sector has created thousands of jobs directly and indirectly. The Director-General of NITDA, Isa Ibrahim categorically stated that Nigeria has been spending \$2, 8 billion annually for the importation of various ICT products and services (Vanguard, 2016). A survey carried out by the International telecommunication union (ITU, 2016) states that Nigeria has a high population density and the sector of wireless communication is considered the main sector that creates job positions, especially the mobile phone sector. Furthermore, in September 2018, a survey carried out by the Nigerian communication commission (NCC) revealed that the contribution of the Telecoms Industry to GDP was rated 7.7% in 2012 as against 10.43% in the second quarter of 2018 (NCC, 2018).

This shows a relative contribution of the telecoms industry to GDP resulting in economic growth. Furthermore, the executive Vice Chairman of NCC, Prof Umar Dambatta of Nigeria revealed that the ICT sector contributed N 500 billion to the Nigerian economy in 2014 and created about 2.5 million jobs in 10 years and attracted \$30 billion foreign investment between 2003 to 2014 (Vanguard, 2016). The revolution of ICT in developing countries is expanding and spreading, giving



hope for these countries to achieve technological advances that contribute to advancing and developing their economies (Zwass, 2003).

Nigeria not being an exception has benefitted from ICT in the areas of banking, the fight against terrorism, e-government and human resource development. Nigeria being a developing country needs radical change in governance and this can only be achieved by reengineering existing governance processes with the help of ICT. The use of ICT can lead the nation to overall economic growth/development.

### **ICT and Economic Development**

The huge advancement in Information and Communication Technology has tremendously accelerated the process of globalization. Okorie (2005) aptly said that the development and spread of technologies like the internet, e-mail, low-cost international phone services, mobile phones and electronic conferencing, among others, have made the world more interconnected. People can share knowledge without having to be in the same place. Communication networks have made life very simple. The entire major development, poverty alleviation and related issues have been linked in one way or the other with the phenomenon of globalization via ICT (Onitiri, 2001).

Information and Communication Technologies have drawn attention to the opportunities to expand exports, attract foreign investment and acquire modern technology for doing things. The knowledge from ICT has brought about increased human technical and social know-how as well as the transfer of successful policies and programmes. Individuals, families and societies can now get accurate and timely information which enhances their productivity and empowerment training and education (Synder and Tadesse, 1995). It also enhances commerce and trading by reducing the time lag, face-to-face interactions, long-distance travel and the risk of carrying huge sums of money across borders for international trade. Money can be paid for goods and services through electronic money transfers such that trading becomes faster and easier throughout the world. ICT provides economic opportunities to both urban and rural populations; it increases productivity and makes the market work more efficiently, although the magnitude of the impact on economic growth is likely to be different. The fact that virtually all new mobile customers in the coming years will be in developing countries and more specifically in rural areas means that the ICT platform is reaching populations with low levels of income and literacy.

ICT is becoming the largest distribution platform for providing public and private services to millions of people in rural and poor areas. Market information, financial services, education and health service had largely been unavailable in those areas in the past due to a lack of connectivity of any kind. Now the wireless platform is promoting new economic and social opportunities at all levels for the poor population. The Internet has many sites that can expose young people to different cultures. Technology innovations like computers, computer software, web browsers and servers have contributed to globalization by supplying infrastructure for world connection. This interconnection has impacted all aspects of the social, cultural, health, economic and political life of people (Akpan, 2004). In Bangladesh, the installation of telephones in rural territories increased the resident's income by 25% over five years. Mashi (2006) in a study of six-week African countries; find a relationship between ICT expansion and GDP growth for the period 1997 –2003. It is a well-established fact that telecommunication is infrastructure and services in the age of information and transnational communication. ICT is the backbone of business activity, productivity, trade and Social development. It is a prerequisite for developing countries economic success. The ability to



develop countries to thrive in the global economy depends on the nation's knowledge of ICT and their ability to proper implementation (Agagu, 2006).

Some developing countries such as South Africa, Nigeria, Ghana, India and China have been making progress in telemetry –the convergence of Telecommunication by linking production to industrialization. Some nations, such as Malaysia, Indonesia and Singapore have all adopted a strategy which aims at industrialization through applications of microelectronics, computer products, and services in management, finance, health care, distribution, manufacturing as well as education. The success of these few is already having an impact on world production patterns, trades and both the social and political environment (Kosakowski, 2005).

The following are measures so far put in place by the Government towards the establishment of a sound ICT industry, products and services in the country:

1. The Federal Government created a Ministry known as the Ministry of Information and Communications to allow for the integration of ICT in government plans and budgets
2. The Federal Government made the teaching of computer studies in the Federal Unity Schools mandatory. Also, the teaching of ICT-related courses is an integral part of the curricula for the three tiers of tertiary education in Nigeria University, Polytechnic and College of Education.
3. The Federal Government provided the Internet gateway through which Nigerians gained access to the Internet, and became part of the global village. An instance of this is Nigeria
4. Internet Exchange Point (NIXP) which handles all local Internet traffic. With the NIXP in place, when you send an email from Onitsha to someone in Lagos, your mail will not need to travel outside Nigeria before getting to its destination, unlike before when there was no Exchange Point.
5. The Federal Government deregulated the telecommunications sector in mid-2001 to ease the communication and information dissemination needs of our people. As at January 2008, there are 1.87 Internet Service Providers (ISPs) with 95 of them active. Thus, the revolutionisation of the telecommunications sector has resulted in an upsurge in Internet penetration.
6. The Nigerian Communications Commission (NCC), an organ of the Federal Government, has initiated a number of programmes aimed at revolutionizing the ICT sector. Such programmes include:
  - a) Slate Accelerated Broadband Initiative (SABI), is aimed at encouraging the private sector to build and run broadband infrastructure with government support and incentives.
  - b) Wire Nigeria Project (WIN)
  - c) Universal Service Provision Fund (USPF)
  - d) Digital Appreciation Programme (DAP), through which computers and satellite links were given to some primary and secondary schools to enable them to connect to the Internet in order to appreciate and use ICT in their schools. In conjunction with Digital Bridge Institute (DBI), Abuja, DAP trained some tertiary institutions lecturers on ICT. DBI is an Institute set up by NCC to train manpower to meet the demands of the telecommunications and ICT industry.
  - e) Issuance of 3G licenses to some telecommunications operators to fibre optic cables across the entire country. Fibre optics infrastructure is preferable to the current basic terrestrial infrastructure like microwave when it comes to Internet and broadband access.



7. The government has also encouraged the immediate installation and use of fibre optics cables across the entire country. Fibre optics infrastructure is like microwaves when it comes to Internet and broadband access.

### **Problems and Challenges of ICT in Nigeria**

1. **High Level of Poverty in the Country:** This is one of the greatest challenges of the ICT industry. How to break the jinx of poverty which is prevalent in the country. The high cost of living experienced in the country has seriously hindered the aspirations of those wishing to buy PC or enrol for ICT training. Because of this, they cannot avail themselves of the products and services offered by ICT nor can they seek for themselves of the products and services offered by ICT neither can they seek employment in ICT -driven places. For instance, can a poor man afford to buy a computer, and possibly connect it to the Internet when he cannot comfortably afford three square meals a day?
2. **Lack or Inadequate supply of Some Basic ICT -Driven Infrastructures such as Electricity, Fiber Optics and Broadband:** A lot of people have waved bye-bye to computer acquisition because of the epileptic supply of electricity in this country. To some people, until there is a constant and steady supply of electricity, there is no need to invest in computers even when they have the money, and quite appreciate their usefulness in our everyday life. Similarly, the blame has been on Nitel for the slow pace in the deployment of broadband because it has not provided the needed transmission infrastructure. Fibre optics transmission infrastructure is needed across the country and Africa to enable broadband development to move on.
3. **The problem of foreign dominance in the Industry:** Currently, the industry is dominated by foreign players. This is because most of the materials like computers and software used in this country are imported thus, leaving no room for indigenous manufacturing. Again, most organizations prefer software thus, discouraging our local developers.
4. **Government Policy:** There should be consistency in Government reform policies on ICT as well as that of the regulatory body (i.e. Nigerian Communications Commission).
5. **Low Level of Indigenous Content:** Our indigenous content in the areas of manpower development, ownership, equipment manufacturing and service provision is still very low.
6. **Expensive Hardware and Software:** The cost of hardware and software is still not within the reach of an average Nigerian.
7. **Relevance:** A lot of people have not yet seen the economic or personal relevance of ICT. For this reason, ICT is not a thing for everybody, but a thing for the few.
8. **Social Status:** A lot of people consider themselves too big or too old to go for computer training in order to become ICT literate. They see it as unnecessary and of no economic or personal relevance.
9. **How to Shift from Mass Consumption to Mass Creativity and Production:** We need firms and industries where some of the ICT basic elements such as hardware, software and communications devices could be produced. This, in turn, will provide employment for our people.
10. **Learning ICT takes some time.**
11. **How to checkmate the activities of quacks in the profession**
12. **How to diversify operations which at present, are concentrated in the urban centres to reach the grass root**



13. There is also the problem of funding with high-interest rates from banks, and staff attrition rate (i.e. Staff who after learning one or two things, run away).

### **Prospects of the ICT Industry in Nigeria**

Nigeria, like most countries of the world, is still developing in the area of ICT. A lot still needs to be done. The future of the industry is very bright because of the following reasons:

1. The majority of the players in the hardware industry are merely distributing and selling foreign brands and offering maintenance and repair services, thus leaving the market open for local manufacturers to explore.
2. ICT is an indispensable tool in the process of globalization and all nations placed a very high premium on its development, and our country is striving to be among the world's top 20 developed economies by 2020. Mandates of the Nigerian Communications Commission (NCC) towards the immediate deployment of broadband and other infrastructure necessary for ICT to flourish point to a brighter future for the industry.
3. Job opportunities for ICT professionals — as an emerging economy, employees are required in the electronics, software and business sectors. ICT usage, under the auspices of cybercafes, Internet Centers and popular business centres has offered lots of Nigerians who would have been unemployed employment. What is very important here is for one to acquire the right type of training that can guarantee employment. Because of the introduction of ICT-driven products and services, banks have employed more hands to take care of their Internet and mobile e-banking services (something that did not exist before).
4. training both within and outside the country was minimized thus, saving companies and people travelling risks, costs and precious amounts of time since one can always reach his/her market through the Internet or mobile phone.
5. ICT Training -Persons who are gainfully employed as well as persons seeking employment need ICT training to enhance their sustainability and increase their chances of gaining employment. This training is 100% mandatory for those who did not specialize in ICT-related disciplines, and somehow, very important for the specialists to complement the knowledge they acquired in school. This stems from the fact that most of our higher institutions lack all the necessary ICT infrastructure and manpower needed to deliver. So their products need to be properly groomed by the specialist schools. Specialist schools are therefore, by this, major stakeholders in the ICT industry, and they owe Nigerians this perfect ICT training needed to meet the ever-evolving needs of ICT usage.
6. The ICT industry, being a major stakeholder, should partner with the Government at all levels too. Make ICT education part of the National Curriculum. And thus, make it a subject in schools.
7. The future is also bright because ICT is a tool that can empower Nigerians, because of its impact on business.

### **Conclusion**

ICT and technology transfer are two vital instruments that enhance the productivity, efficiency and competitiveness of the Nigerian economy. In line with the pursuance of Nigeria's economic transformation agenda called Vision 2020, which is determined to place the country



among the top economies of the world by the end of the year 2020 it becomes necessary to utilize the opportunities rendered by ICT and technology transfer via innovation in modern technology and industrialization. The ICT industry in Nigeria is fast growing, though not without challenges and problems. The ICT industry in Nigeria will take its place of pride among the ICT-developed countries of the world when all these obstacles are overcome. If the Government will be able to vigorously pursue some of its lofty programmes already put in place to address some of these issues, the ICT industry will receive a big boost in the nearest future. To help the ICT industry thrive, there is a need for steady electricity at affordable costs, reduction in poverty level, provision of infrastructures like optics and Broadband, and ICT content policy. This paper has appraised it and its relevance to national growth. The paper is subdivided into seven units and conclusively presents some vital recommendations which are of good assistance to Nigeria as a nation if appropriately utilized.

### Recommendations

The following suggestions can help solve some of the problems and overcome the challenges mentioned above if appropriately utilized.

1. Policies should be initiated, aimed at promoting ubiquitous broadband deployment, irrespective of the increase in digital applications, and the divide between Africa and the rest of the world.
2. Effective establishment of broadband applications will facilitate public security, telemedicine, e-government, distance learning, utility applications, among others.
3. The government should provide a local content ICT policy that will mandate the telecommunications and ICT industry to source some specified amount of their hardware and software needs locally from Nigerian professionals.
4. There should be stability in Government policies and implementations of ICT.
5. Importantly, agreed guidelines among major stakeholders (such ISPs, Association of Computer Professionals, and telecommunications operators) in the industry to optimize operations and services delivery, enhance security and minimize the activities of criminals.
6. The initiation of ICT policy should specify the minimum local ICT participation in projects across all sectors. More so, Policy should conform to international standards that will guide its implementation.
7. There should be a planned and guided ICT Curriculum to produce indigenous ICT skills in different areas of specialization.
8. Turning the computer village at Ikeja into an ICT park, to serve as a base for local manufacturing of ICT products and software development. Currently, the village is serving as a distribution market for ICT tools and equipment.
9. Local software developers and manufacturers should endeavour to acquire the necessary skills that will enable them to produce highly professional products that can compete favourably well with their foreign counterparts.

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