

## Discovery of ICT for the Growth and Development in Sub Sahara Africa: Utilization, Enlightenment, Effort and Challenges

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### ABSTRACT

This paper will actually focus on the issues relating to the growth and developmental challenges of Information and Communication Technologies (ICT), literacy needs, enlightenment and absence of ICT devices for human development and lack of formal skilled approaches to the understanding and application of ICT in sub Sahara Africa. Several data on ICT efforts were collated from documented materials, literature, Journals, electronic and non electronic media and other sources to assist in this discussion; including historical and analytical reports on ICT in some Africa country like Nigeria, South Africa, Togo to mention but few relating to the impact, capacity building and citizenship participation on the ICT process. Recommendations for ICT policy improvement in the field of literacy, special education, formal and non-formal education for urban and rural dwellers in Africa nations were also provided.

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## 1. INTRODUCTION

Globally speaking, literacy, special education, formal and non-formal education instructors are constantly challenged with new educational technology inventions, tools and resource materials, as well as faced with Information and Communication Technologies (ICT) that aid in the training, learning, skill acquisitions and applications by individuals; for independent living, employment, community integration and attaining other forms of postsecondary options in the society. Both gifted and exceptional citizens worldwide require modern ICT knowledge skills for growth, survival at home (whether it is in urban or rural community), become productive in the workplace and achieve community development goals. Information and Communication Technology (ICT) innovations have come to stay in this 21st Century and beyond; every nation and people are constantly faced with the challenges of ICT in different sectors of human development, community improvement and nation building.

The global quest for ICT for development is enormous to both urban and rural communities because ICT skills are critical to the success of enhancing national development in a globalised era (World Bank, 2006). In this regards, governments in developed and developing societies strive to create opportunities for citizenship participation in ICT training, creative knowledge, skills acquisition, general application and usage of ICT tools to solve problems, promote their wellbeing and enhance national growth.

Furthermore, rudimentary intermediate-level ICT skills necessary to function optimally in basic computer-related environments are crucial to national competitiveness in a developing context. The supply of these skills provided predominantly by private, non-state institutions in most developing contexts is considerably under-researched, argues Atchoarena and Esquieu (2002). Several attributes have been given to Information and Communication Technology (ICT), Information Technology (IT) but they all focus generally in one direction, i.e. to aid in human development, growth and facilitate standard and effective living.

Bialobrezeska & Cohen (2003) regarded ICTs as technologies that generally support an individual's ability to manage and communicate information electronically, and include hardware such as computers, printers, scanners, video recorders, television, radio, and digital cameras; as well as the software and systems needed for communication, such as the Internet and e-mail. Information technology (IT) is "the study, design, development, application, implementation, support or management of computer-based information systems, particularly software applications and computer hardware", according to the Information Technology Association of America (ITAA, 2008). Today's professionals in information technology obtain training skills and certification in performing several roles in the areas of installing applications to designing complex computer networks and information databases – multimedia applications, processes, computer software, computer hardware, programming, data constructs, among others.

The public/private enterprise, educational systems and non-governmental institutions are not left out in the quest for ICT development, applications and usage in different facilities and environments. Private/public enterprises, non-governmental agencies and industrial concerns have embraced ICT to solve problems, earn revenue and improve work and productivity in the workplace. A few of the duties that IT professionals perform may include data management, networking, engineering computer hardware, database and software design, as well as management and administration of entire systems. Technology can help an organization improve its competitive advantage within the industry in which it resides and generate superior performance at a greater value (Bird, 2010). The personnel of these establishments integrate technologies, such as the use of personal computers, assistive technologies, cell phones, televisions, automobiles, specific electronic gadgets, and many others; to provide services, attend to problems, handle work demands and increase productivity.

Communication involves the interactive exchange of information, ideas, feelings, needs, and desires, states Heward (2009); adding that, communication involves a message, a sender who expresses the message, a receiver who responds to the message. In this regards, communication functions solely to facilitate the process of narrating, explaining/informing, requesting and expressing information, materials and items which human beings encounter daily in life. It means that when a sender transmits a message to a receiver through some medium – could be via word of mouth, telephone, text messaging, fax, telegraph, written expression and other multimedia channels. The receiver then decodes the message and gives the sender a feedback. As far as literacy, non-formal education and special education are concerned, individuals acquire life skills and use various modes of communication; for instance there are verbal and non-verbal means of communication. i.e. auditory means, like speech, song, and tone of voice, and the visual/nonverbal/physical means, like using sign language, body language, eye contact, touch; through different media, such as, graphics, pictures, writing and sound process.

This paper attempts to identify the development, usage and challenges of ICT in Africa, with particular reference to ICT for literacy, formal and non-formal education, and special education development of rural and urban Nigeria.

## **2. DEVELOPMENT OF ICT IN AFRICA**

Bellis (2010) provided a list of different historical inventions which aided ICT development back in 3500 BC when the Phoenicians developed an alphabet; the Sumerians developed cuneiform writing - pictographs of accounts written on clay tablets; and the Egyptians in North Africa developed hieroglyphic writing. Bellis accounted further that from 1445; Johannes Gutenberg invented a printing press with metal movable type; 1821 Charles Wheatstone reproduced sound in a primitive sound box - the first microphone; and in the 1900s when different technologies - radio, telephones, electronic gadgets, motion pictures emerged. Today, we have computers, videos, television, wireless network and the birth of World Wide Web (WWW), making communication at light speed, Bellis, concluded. Several developed and developing nations have since embraced the developmental trends and utilization of ICT tools and resources.

The global quest and development of ICT, notwithstanding, the African continent has a lot to worry about, especially on the invention, adoption, development, training, availability and application of ICT resources and tools in different sectors of the African economy. Many African nations are lagging behind in ICT development and adoption in their urban areas, not to mention the rural community settings; thus, an urgent need for more ICT sensitization and for support. Okpaku (2002) disclosed that the UN ICT Task Force Summit meeting held in Kananaskis, Alberta, Canada on June 26-7, 2002, the Heads of State of the G8 industrial countries endorsed the program and Implementation Plan of the New Partnership for Africa's Development (NEPAD), the strategic development initiative of the African Union (AU). The G8 Africa Plan of Action, emphasized support for ICT Development in Africa, and commits the member states to providing support for enhancing Africa's ability to develop ICT capacity, as well as to create ICT-friendly environments in Africa.

### 3. HOW ICT EVOLVED: IDEAS & EFFORTS

Since the 1990s, there have been several initiatives signed by African governments and UN agencies promoting ICT programs. For instance, the Global Digital Opportunity Initiative which plans support for ICT development in twelve African countries. This program, according to Okpaku (2002) holds immense potential for driving ICT development support in Africa in a consistent and coherent way, especially the support of the indigenous African private sector, the ultimate repository and arbiter of long-term durable industrial and competitive capacity-building and knowledge acquisition in Africa.

Aside from the UN/AU ICT initiatives, different African governments, including Nigeria, have become aware of the need for ICT development and training to boost the manpower, general workforce development, improve the peoples' wellbeing and sustain the economy. Many government institutions, private firms and NGOs in Africa are striving to assist in the provision/availability of ICT training programs at all levels in schools and work environments. Akoojee & Arends (2009) revealed, for example, in South Africa, considerable attention has been paid to intermediate level ICT skills in light of the advantage of ensuring that the country develops a competitive edge with a view to attracting investment to respond to national transformational prerogatives including growth and employment creation. Considerable attention has been paid to higher-end ICT skills provision (Moleke, Paterson, & Roodt, 2003; Paterson, McGrath, & Badroodien, 2005), but similar studies have not been replicated at the intermediate-level. It is contended that this is where most national development benefits accrue in terms of employment-generation.

In response to limited resources, Kinuthia (2008) reported that many African governments are partnering with each other; Western countries, private enterprises, and nongovernmental organizations (NGOs) to pull together their resources and to share successes (LaRocque, 2003). A higher education example is the African Virtual University (AVU), which was launched in 1997 as a World Bank sponsored project has encouraged the establishment of e-learning, Open University education and distance education programs in different African states for capacity building; developing and disseminating open and distance learning (ODL) and e-learning content; delivering degree, diploma, and certificate programs; for example, the Open University of Nigeria (OUN) located in Lagos.

Despite the vision and efforts for African ICT education programs at high levels; the public schools system in Nigeria is yet to undergone drastic changes to move away from a system that offered substandard schooling (in the inclusion classrooms, adult literacy, formal non formal education, and special education settings) to Nigerians and a high matric failure rate, to a competitive national curriculum where ICT would be fully recognized and affordable with physical structures, facilities and resource materials readily available to every institution. Nigeria's public education requires technological content (ICT theory, practical applications, experiments, and innovative research) based on outcomes-based education, which requires the learning process to be an interaction between learner and teacher. Nigerian institutions need concise curriculum with clear ICT education goals, government commitment to ICT development in the public school system; just like in South Africa where the use of ICTs in achieving specific curriculum outcomes were highly emphasized in 2004 (Department of Education, 2004).

It is appalling to note that for many years, the major thrust in the Nigerian governance has been the search for ways in which the leadership, technocrats and instructors could be convinced that ICT should be an integral part of community and national development, need for skills training and effective instructional curriculum and ICT delivery strategies. In principle, the federal government intends to utilize every available opportunity to make Nigeria's Millennium Development Goals (MDGs) commitments and Vision 20-2020, not a pyrrhic victory but a lasting reality, says the Nigeria ICT Forum 2010.

#### 3.1. How has ICT Changed Lives

Nigeria, like the rest of the world, recognized the globalization and significance of information and communication technology (ICT) to meet the growing demands of work, business, production and services in different sectors of the economy. Thus, ICT has had a great impact on the lives of many Nigerians by offering them a world of opportunities with the introduction of automated services in the manufacturing and industrial sectors, banking business, trade and commerce, telecommunications, transportation and aviation industry, and other areas unlike when computers and multimedia technology didn't exist.

Things were quite different about a decade ago when most private businesses, public agencies and government offices could not conduct transactions with effective technology gadgets – example, use of computers, ATM machines, iPods, electronic filing system, and individuals being capable to access the World Wide Web and other information and communication technology network with ease. In this contemporary era, many Nigerian establishments, shopping centers, businesses and nongovernmental organization' corporate projects/programs rely on ICT facilities e.g. automated machines for all kinds of financial, management and service firms, medical equipment used by hospital professionals (doctors, nurses, x-ray technicians, laboratory experts), telecommunications (telephone operators, telemarketing, telex, etc.),

broadcasting (radio, television, cable network), law enforcement (police, military, firemen – signals and communication gadgets though needs to be improved and made available to the officers for efficiency and effective protection of lives and properties in urban and rural communities), postal services, etc., all use ICT facilities.

Furthermore, several unemployed Nigerian youths rely on ICT training and facilities for their daily livelihood, for instance, upon graduation from an institution of learning (both high schools and universities) and staying at home for years without employment, many of these unemployed youths have the vision to enroll for formal or non formal trainings (depending on the affordability) in computer programming, web designs and word processing, cell phone and computer repairs, software installation, repairs, data entry process, e-learning, e-marketing, e-trade, e-commerce, etc. The acquisition and application of such ICT skills have opened opportunities for jobs and engagement of young adults in urban centres. Today, business centres and cyber cafes are opened daily in many Nigerian cities like, Lagos, Abuja, Onitsha, Ibadan, Kano, Sokoto, Kaduna, Owerri, Aba, Enugu, Benin, Port Harcourt, Calabar, among others towns, to meet the ICT needs of the citizens and business organizations. These business centres and cyber cafes provide services such as typesetting of documents, printing, production of different projects, company brochures, reports, proposals; use of internet and web facilities, online blogging and social networking, making local and international phone calls, selling telephone cards for MTN, Glow, Etisalat, Airtel, Zain, among other telecom firms.

The movie industry and telecom business is now a multi-billion naira business in Nigeria with the participation of citizens from the urban and rural Nigeria – in acting, performing and enjoying mobile phone services. The home movie industry for instance, have permeated into the mainstream Nigeria market and overseas, cutting across interest in various multimedia levels; and so is the use prepaid phone cards which are relatively affordable. It should be noted that with the advent of the privatization of telecommunication industry and network in Nigeria, several young Nigerians are being employed by these multinational corporations operating in Nigeria, and even self-employed youths setting up makeshift outlets for selling prepaid cards in the marketplaces, bus stops and street corners in the urban and rural areas.

### **3.2. The Implication**

Nigeria imports virtually 100 per cent of all its IT equipment and a diversity of firms exist to supply, service, and maintain the imported equipment, according to Nwachuku (n.d.), who stressed that there are however problems associated with poor vendor performance and the high cost of computing equipment, installation and software application issues. Nigerians have embraced the ICT industry especially in the urban areas than in the rural communities where ICT tools are not readily available due to several factors, like lack of electricity, computer network, poor training skills, and motivation. The vast majority of Nigerians in urban centres are aware of the ICT industry, and many are utilizing the opportunities.

With the proliferation of computer network facilities and telecommunication business in urban centres many Nigerian youths are migrating to urban cities seeking greener pastures – jobs, trainings, apprenticeships, connections. This new development has created overcrowding and over population of some areas like in Lagos metropolis. There are no amenities and infrastructures in most rural areas in Nigeria, hence, lack of power supply and cottage industries to provide jobs and services to the rural population. Furthermore, able-bodied men and women are abandoning their farming communities for urban centres, in search of white collar jobs. This situation is creating population explosion, unemployment and increase in crime wave. Aba, Owerri, Awka and Enugu in eastern Nigeria has witnessed young men and women abandoning formal schools, family business and farming in their rural communities to these cities in search of employment; thus, engage in riding motorcycle taxis popularly known as ‘okada’ while some unscrupulous ones engage in robbery and kidnapping of hardworking people for ransom.

### **3.3. Hope on ICT for Urban and Rural Dwellers in Nigeria**

ICT has so much promise to Nigeria and Nigerians, judging from the resourcefulness and ambition to acquire professional skills and ICT facilities by the government and her citizens. Several firms are doing creditable and commendable jobs, in spite of their numerous handicaps, in supplying and maintaining the growing need for computer equipment and services in the Nigerian market. There is hope for significant improvements and increase in ICT awareness in the coming years in Nigeria, as suppliers take advantage of globalization of ICT, liberalization of foreign exchange and the increased volume of business expected from the fast growing computer and other forms of multimedia usage in urban areas. This would gradually trickle down to the rural communities, especially if the electricity/power supply situation in Nigeria improves.

Furthermore, aside from the establishment of several under-funded universities of technology across Nigeria; the National Information Technology Development Agency (NITDA) of Nigeria, among other ICT groups and organizations are poised to promote ICT advancement in Nigeria alongside the government,

provide information, support and contribute to ICT policy making at all levels for national growth. New ICT-related tools have been known to make institutions and markets more productive, enhance skills and learning, improve governance at all levels, and make it easier for services to be accessed (Opara & Ituen, 2009). The supply of ICT skills represents an integral component of the overall national development trajectory of countries in a globalised world, opines the World Bank, which had expressed in 2009 its readiness to kick-start a \$2m (N300m) investment on facilities to promote growth and employment projects which would further strengthen ICT development, as well as the entertainment (music, movies and films) industry in Nigeria, according to Opara & Ituen reported.

The Nigerian government should be commended for its recognition of the need for a wide usage and exploitation of ICT tools in the country, as well as identification of capacity building as a paramount focus of the government towards enhancing career progression and development among Nigerians, particularly those in ICT and the industry, for a better and quality output that would have multiplier effects on the nation's economy (Opara & Ituen, 2009). In this regards, the government should ensure that all school children will be able to utilize ICTs by the year 2020 (in line with the national vision for an educated and industrially developed society). However, some Nigerian universities are gradually soliciting ICT support from several foreign agencies – computers, internet/web-based facilities and e-learning instructional resources, example the University of Lagos, Covenant University, University of Ibadan, University of Nigeria, University of Lagos, Nnamdi Azikiwe University, etc. Most of the libraries have internet facilities for students, faculty and staff to access information, but they are not adequate.

### **3.4. The Impact**

The growth of information and communications technologies is changing the way Nigerian economic and social structures develop, especially in rural and urban education settings. This needs a critical appraisal. The Nigerian ICT industry is witnessing great changes in hardware, software and connectivity, and related training/implementation strategies in the teaching and learning environments, which often appear to have taken center stage as the people struggle to acquire survival skills in the urban and rural communities.

One of the challenges facing researchers investigating how information communication technologies (ICTs) are being used in teaching and learning environments is devising a conceptual and analytical framework to guide the design, analysis and interpretation of empirical studies, according to Hodgkinson-Williams (2006). This handicap is applicable to the Nigerian environment. There is a need for adult educators and special education specialists to collaborate to develop ICT literacy primers, e-learning and distance education programs, assistive technology and therapy services for adults and exceptional individuals within the community so that learning could take place in their life.

With regards to Non-formal education (NFE), Kinuthia (2008) argued that Non-formal education has always played an important role in Africa, especially because of its non-compulsory, semi-structured, flexible nature: Its popularity is linked to its lifelong learning, experience-based, self-directed approach, and in many cases its immediacy of application of acquired skills. For that reason, it is commonly used for teaching basic and functional literacy skills, educational programs related to development initiatives—health education for example—and promotion of best practices such as agriculture. These are all important development indicators for many African nations. There is a need for the creation of appropriate e-learning networks for public education in regular classrooms, special education and non-formal education settings to enhance the capacity of teachers and their institutions to become more responsive to new challenges in ICT instruction through the formal and non-formal education process. This could be achieved by connecting online training and distance education instruction via different institutions.

### **3.5. ICT Challenges & Recommendations**

Nigeria as a developing nation should strive to apply ICT structures in all sectors of development for the citizens, harnessing the national manpower and general growth of every sector of the economy. The development of digital technologies and the convergence of broadcasting, telecommunications and informatics offer sizeable opportunities for the implementation of appropriate new technologies by developing countries. The program assists developing countries to plan, build, operate, upgrade, manage and maintain technologies applicable in their networks and services. This includes the development of the Telecommunications and Information infrastructure and applications (ITU, 2010). Nigeria is not included in the recent International Telecommunication Union (ITU) reports on most advanced countries in ICT over five-year period from 2002 to 2007. Out of the top 154 countries, no Third World and developing country was listed. The most advanced countries in ICT were mainly from Northern Europe, with the exception of the Republic of Korea, which is in the Asian continent. Sweden tops the new ITU ICT Development Index, followed by the Republic of Korea, Denmark, the Netherlands, Iceland and Norway.

Nigeria is, indeed, developing in the area of ICT but there are still some loopholes, which are affecting its total advancement in this area, lamented Opara and Ituen (2009); referring to the International Telecommunication Union (ITU) report which listed the following as indices for ICT compliant and benchmarking tool globally, regionally and at the country level. "These are related to ICT access, use and skills, such as households with a computer as well as the number of Internet users; and literacy levels," says ITU. People in rural Nigeria are willing to learn new things through formal and non-formal education settings, if such opportunities are provided. Nigerians are smart and resourceful no matter where they reside. Nigerians are always ready to learn new things and open to change, as well as adapt easily to new environment and technologies. The absence of non-formal education centers in rural communities of Nigeria discourages ICT training and knowledge acquisition by the citizens. ICT resource availability and affordability are major handicaps. Thus, the citizens are to fully utilize the potentials of ICT if they have unlimited and poor access to the Internet facilities and computer education. Even in urban areas, access to personal computers and internet is largely limited and expensive to most Nigerians.

All these issues, notwithstanding, the Federal Executive Council of Nigeria, approved a national IT policy in March 2001, view to solve ICT problems in the country. Government established the National Information Technology Development Agency (NITDA), charged with the implementation of ICT policies. The policy recognized the private sector as the driving engine of the IT sector. There are calls for an ICT policy reform in Nigeria so that individual citizens could access the training and services. In this light, the governments setup the Nigerian National ICT for Development (ICT4D) Strategic Action Plan committee to develop a new ICT policy for development as the ICT action plan / roadmap for the nation. The Nigerian government should ensure that this agency provides the needed services for a sustainable intervention, and environment for creating affordability and accessibility to ICT gadgets and trainings

#### 4. CONCLUSION

1. Universities, national research centres and the National Information Technology Development Agency (NITDA) should collaborate with international agencies to review and establish the needed special ICT courses/programs and projects that would provide skill training opportunities for people in the field of research, creativity and innovations on ICT infrastructure; content development, law, policy and regulatory affairs, industrialization, governance, online distance services, including telemedicine, distance education, and Internet marketing.
2. Federal government should allocate more funds to ICT education nationwide; provide adequate ICT resources and training opportunities for people in rural and urban communities. In addition, power supply must be steadily available for such program to be successful.
3. Special ICT personnel and special educators should be trained on the use of ICT facilities and assistive devices so that individual learners and exceptional adults could benefit from such trainings whether in a formal or non-formal settings in urban and rural Nigeria. Schools must be equipped with ICT gadgets and tools, including assistive technologies, like Braille for the visually impaired, mobile wheelchairs, cochlear implants and other hearing aids, among other devices for students with disabilities and handicapped adults, etc., for the national ICT compliant dream to be accomplished.
4. Improvement of access to technological tools and the internet in urban and rural communities. Advantage should be taken of organizations like the Free and Open Source Software Foundation for Africa (FOSSFA) and LinuxChix Africa, which are promoting the use and development Free/Libre Open Source Software (FLOSS).
5. Government/private firms should develop and promote the emergence of rural telecommunication operators and encourage telecommunication operators either incumbent or new to provide services in rural/remote communities with appropriate private investment incentives with pro-active regulatory environment. .

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