

# ICTs for Sustainable Development: the Nigerian Experience

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## Abstract

The importance of Information and Communication Technology (ICT) in national development cannot be over emphasized going by the experiences of the advanced nations of the world. It is a means of attaining international relevance. The Nigerian Government has recognized the need to square up to the challenges of ICT revolution in order to bridge the digital divide being experienced by the country presently as well as transforming Nigeria into ICT-driven and knowledge-based society. To this effect, several projects/programmes have been put in place including the creation of virtual libraries in Nigeria. This paper explores into ICT situation in Nigeria. It highlights the various activities of the government in relation to ICT development and progress recorded so far. Finally, recommendations are made on the way forward for Nigeria.

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## Introduction

The information Age and its array of information and communication technology (ICT) have led to a interconnected and interdependent world. The scenario has influenced the development of libraries without borders, thus enabling globalization of library and information services. Hence, at the mere press of a button, one can have instantaneous access to global information for various purposes. It is indeed a golden opportunity for developing countries, particularly African countries to draw from the ocean of developed nation's information for national development and at the same time contribute to global pool of information.

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It is obvious that a highly developed information and communication technology is a sine qua non for the attainment and sustaining of global relevance of every nation. Therefore, every nation must place premium on ICT/Library development. This is in accord with World Summit on Information Society (WSIS) agenda, which aims at achieving the emergence and evolution of an all – inclusive information society on the platform of ICTs as a means of achieving major global developmental goals, particularly, millennium declaration made by the world leaders in September, 2000.

This is targeted at eradication of global problems most importantly that of poverty eradication by the year 2015. All nations of the world must strive towards the accomplishment of this goal for global progress and prosperity.

### **The Nigerian Situation**

Advances in ICT are phenomena in the Western Europe and United States of America, which are centres of industrial and ICT revolution. The situation in Nigeria is a far cry from what obtains in the advanced nations. Nigeria is, however, coming along but at a lower pace as observed by Adediji (2001) “we hop rather than leap, automation wise”. Consequently, Nigeria is still trapped among the group of nations categorized as information poor societies. Low – level technology, inadequate planning, poor implementation, lack of expertise, under funding and high costs of equipment occasioned by unfavourable exchange rates are major factors militating against ICT revolution and development of virtual library in Nigeria. Although Nigeria is not relenting in her efforts to be part of the global village, a lot still needs to be done in order to achieve a breakthrough in ICT. Ayodele (2001) sheds more light on this thus:-

The developing countries and Nigeria for that matter have been aught on the backwardness called digital divide i.e. we have been left behind by some ten years and in a revolution that is moving at the speed of light to say ten years is a lot. Thank God, we have a vibrant knowledge thirsty citizenry whose only handicap is lack of opportunity. Thanks to ICT the world has been made a global village. Given the right learning environment the materials to help bridge the digital divide is at our fingertips.

However, the Federal Government saw the situation as a challenge and has risen to the occasion by putting in place policies and measures that will bridge the digital divide and transform Nigeria into a key player in the global village for socio- economic advantage. Recognizing the importance of ICT as indispensable tool in national development, the Federal Government of Nigeria has accorded ICT development a national priority. This has found expression in the policy document tagged “National Policy for Information Technology”, which contains national IT policy guidelines for the country. In the preamble, the Federal Government observes that:

Information Technology (IT) is the bedrock for national survival and development in a rapidly changing global environment and challenges us to device bold and

courageous initiatives to address a host of socio –economic issues such as reliable infrastructures, skilled human resources open government and other essential issues of capacity building ... It is for this reason that every progressive country has national IT policy and an implementation strategy to respond to the emerging Global reality and thus avert becoming a victim of digital divide. A developing nation like Nigeria that aspires to participate effectively and be a key player in the emerging information age needs to have in place a highly efficient information technology system driven by a vibrant national IT policy ...(FGN,2001)

Really, a careful study of the national IT policy guidelines shows that there is great need for ICT knowledge. Accordingly, the Federal Government, through National Communications Commission (NCC), National Information Technology Development Agency (NITDA) and National Space Research and Satellite Development Agency (NASRDA), has initiated several programmes and projects which have proved effective.

### **Liberalization of Telecom Sector**

Formulation of ICT policy and liberalization of telecom sector aimed at creating the necessary enabling environment for public-private partnership for ICT development was one of the measures adopted by the Federal Government of Nigeria towards acceleration of ICT development in the country. This dates back to 1998 when the National Communications Commission (NCC) licensed over 50 Internet Service Providers to market services. Full liberalization took place with enthronement of democracy and responsible government in 1999 with the following objectives:

- to improve services
- to eradicate misuse of monopoly power
- to increase sector efficiency through competition
- to encourage innovation and advanced service
- to attract local and foreign investments
- to extend services to underserved and un-served area.

To this end, a new telecom policy was released in 2000, the hallmark of which was the full liberalization of the telecom industry. Hence, several measures are currently being taken to ensure the success of the policy. The policy of opening up the market to competition and attracting investors has contributed immensely to the rapid growth of the ICT industry, especially, telecom segment. Today, there are numerous ICT companies of different types in the country rendering various kinds of services ranging from library/offices, automation and Internet connectivity to telephone services.

### **The Size of ICT Industry**

Available official statistics show that there were 14,800 ICT companies of varying sizes and activities in the country as at 2003, while the population of computers stood at 2,855,555. Out of this figure 672,700 were in homes and the rest in offices. Also, virtually all organizations sampled engaged in multiple types of activities. For instance, the companies in computer sales and services also claimed to provide consultancy services. Virtually all the

establishments who engaged in computer sales also assemble unbranded computer system (clones).

**Table1: Distribution of Establishments by Types**

Types of Establishments	Distribution (%)
Telephones/Tele-centre Services	45
Computer Sales and Services	36
Computers Assembly (Formal and Informal)	22
Cyber café Services/ISP's	21
Web Design	21
Software (Sales and Services)	19
Web Hosting	11

Source: adapted from NITDA ICT baseline study, 2003.

**Table 2: Distribution of ICT Establishments by Zone**

Zones	Distribution (%)
Special Lot (Lagos & Abuja)	26
South – South	26.7
South – East	14.6
South – West	13.2
North – West	7.3
North – Central	7.0
North East	5.2

Source: adapted from NITDA ICT baseline study, 2003.

The South – South had the highest number of ICT companies with a slight edge over special lot. This could be attributed to the presence of oil companies and oil operations in the zone, which is propelling economic activities. The North – East had the least population of ICT companies.

### Internet/Telephone Infrastructures

Internet and telephone are key ICT infrastructures. The concept of globalization and online services has rendered Internet indispensable for countries, organizations and individuals. More and more organizations have hooked up to the Internet for global transactions and online services. The National Information and Telecommunication Development Agency (NITDA) provides insight into the Internet/Phone lines growth in Nigeria as at 2003 with the following details:

- Internet Access in Nigeria was established in 1996.
- There were six hundred (600) Internet Access points and 150 licensed Internet service providers (ISPs) in Nigeria out of which only about 50 were actively providing full Internet on real – time basis.
- About half of the respondents (44%) used dial up, VSAT (22%), 12% each opted for dedicated lines and wireless access.
- 71% of the users were males while 29% were females.
- Cyber cafés were the most popular means of Internet access in the country.
- A good number of the country’s organizations do not just have access to the Internet but also interestingly have their own websites on the Internet.
- The quality of service was generally consistently below average.
- Corporate organizations, users and cyber cafés who deployed VSAT and well installed wireless access enjoyed high quality Internet services.
- The Internet geographical coverage in Nigeria was 20% while total geographical coverage of telephone infrastructure and services stood at 50%
- GSM phones were the most widely used means of communication in Nigeria.
- The industry was largely commercialized.
- This industry segment was underdeveloped, highly fragmented and populated with scores of SME type of businesses.
- The predominance of dial up service was historical since most subscribers started with dial – up.
- However, wireless tends to serve more users than dial –up due to is always on nature and improved bandwidth quality.
- A significant number of private telephone operators were beginning to offer bundled Internet Access to their subscribers on their networks.
- Also worthy of note was the absence of an Internet exchange, and domain name administration in Nigeria; as well as minimal local information content(NITDA ICT Baseline Study,2003)

The above facts date back to 2003; nonetheless, internet/telephony has continued to witness expansion while the Nigerian Government is addressing issues arising from the analysis.

In a related development, a study carried out by C.M.C. connects on Internet in Nigeria and published in the punch newspaper of Tuesday, 30<sup>th</sup> March, 2004, revealed:-

- About three million Nigerians were having access to Internet services. This was considered small when benchmarked with 120 million populations of Nigerians.

- The use of Internet in Nigeria had been largely elitist as it is mostly used by the urban working class and students
- Also, Internet usage was mostly shared in offices at no direct cost to authorized users and cyber centres where people pay to use.
- The usage of Internet at home was minimal.
- The Internet subscribers had various options open to them. These included the use of radio waves, wireless dial up, VSAT access supplied by ISPs, network operators or cyber café. Generally, subscribers did not have a good understanding of VSAT technology.

Finally, the survey acknowledged the fact that the Internet industry in Nigeria has recorded some progress when compared to 90s when only few people in the country were connected to it. This has been attributed to the liberalization, deregulation and privatization embarked upon by the Federal Government. About the same time the *Guardian Newspaper* in a publication, titled “Why Internet connectivity is Low?” published on 6<sup>th</sup> of April, 2004 painted another picture of Internet market in Nigeria. It reported that:-

- Poor Internet Market had become a major source of concern to end users in the country.
- More and more people especially corporate organizations were opting for Very Small Aperture Terminal (VSAT) in place of dial up and radio connectivity. But this option was not only expensive but also difficult to acquire.
- The situation according to the opinion of the Cyber café operators hindered those who want to connect to the much cherished technology.
- Consequently, end – users were asking for access rate that were not only affordable but realistic adding that if the rates were realistic the much talked about rural – urban drift would be controlled. This would create an enabling environment and replicate what Global System of Mobile Communication (GSM) had done for voice communication and this would lead to Internet revolution in the country. It should be noted that the use of mobile phones has increased tremendously.

The above ratings are somewhat consistent with the findings of NITDA in 2003. The situation remains the same with minor changes. Cyber cafés still remain the most popular means of Internet access. But Internet connectivity via VSAT link is widely gaining ground. Again, the GSM phones remain the most widely used means of communication in Nigeria.

Slow Internet development in Nigeria has been attributed to high cost of bandwidth, computers, Internet infrastructures and unreliable power supply (Ndukwe, 2006). These challenges are being tackled head on. Several measures have been embarked upon to stimulate Internet penetration and high quality services so that Nigerian people are able to enjoy improved quality of services.

The following are some of the measures put in place:

### **State Accelerated Broadband Initiative (SABI)**

The project is aimed to encourage private sector to build and run broadband infrastructure with government support and incentive in all the state capitals and selected major commercial cities in the country. It entails the provision of wireless broadband services in Nigerian cities to stimulate increase in Internet usage as well as stimulation and acceleration of opportunities in e – education, e – commerce, e – governance and all electronic related activities.

### **First Internet Exchange Point**

Nigeria's first Internet Exchange Point (I X P) has been established in Lagos and it is to be managed on a not – for – profit basis by an eleven – member board at the National Communications Commission (NCC). Internet exchange points (I X Ps) are points at which various computer networks interconnect so that local Internet traffic stays within with only international traffic exchanged at points beyond the country's border. Before this time, absence of domestic I X P means that all outbound traffic from Nigeria had to be routed through International Internet exchange points most commonly via satellite. This is to ensure faster and a more effective communication.

Nigeria's first Internet Exchange Point (I X P) is the result of collaboration between the Nigerian Communications Commission (NCC) and the Internet Service Providers. It would be recalled that the first attempt at the establishment of Internet exchange point was in March, 2003 at Ibadan. However, the Ibadan Internet Exchange (IBIX) was short-lived as it lasted for only six months.

### **Digital Bridge Institute**

This establishment of Digital Bridge Institute at Utako District, Abuja is also one of the measures adopted by the Federal Government towards addressing the need for local training and development of required manpower resources for the industry. It was conceived and implemented to address the immediate and future ICT needs of public and private stakeholders. Top on the list of DBI mandates is capacity building and ICT related policy and regulatory matters. This is intended to reduce the large number of expatriate staff being employed at rather exorbitant salaries and huge amount of expenses several companies incur to train their staff outside the country. Apart from DBI, Ministry of Communication is also working towards the upgrading of the facilities of the telecom training schools at Oshodi and Kano to enable the institutions have adequate facilities for manpower training not just for Nigeria but for West Africa. It is hoped that the full utilization of the ultra – modern citadel of learning and upgrading of the Telecom Training Schools will enable the nation to contribute to bridging the gap being experienced by it.

### **Digital Awareness Programme**

As part of its Digital Awareness Programme, the NCC has uplifted about 53 secondary schools and tertiary educational institutions with computers and Internet facilities. (Ndukwe, 2006)

### **First Digital World Conference**

It is note worthy that the first Digital World Conference took place in Nigeria in October 2006. This was meant to promote dialogue and action towards taking full advantage of ICT tools to address the challenges and requirement for education and development in Africa. This is a plus for Nigeria.

### **Introduction of General Packet Radio Services (GPRS)/Value Added Services**

A new dimension into Internet connectivity has been introduced with hundred of thousands of young people now accessing the Internet on their Web Access Point (WAP) – enabled mobile phones, smart phones and their Personal Computers (PCs) using their phones modem. This is largely due to the introduction of GPRS (General Packet Radio Service) connectivity by GSM operators. All the four existing GSM networks presently offer GPRS services.

### **Domain Name Administration in Nigeria**

The administration of the top – level domain name for Nigeria dot **ng** has passed onto the newly inaugurated *Nigeria Internet Registration Association* (NIRA), which emerged on May 1, 2007 after over a decade of controversy as to who takes responsibility for its administrations. Before this time, the Nigeria Internet Group (IMG) was responsible for the hosting of the top – level domain name for Nigeria. The Federal Government through National Information Technology Development Agency (NITDA) sponsored activities that led to the creation of (NIRA) and membership is open to anybody that belongs to the Internet community: People that have registered **ng** domain, people that have addresses that is **ng**, ISPs and people that are IT oriented.

### **Unified Licensing Regime**

The Nigerian telecom regulator, NCC has introduced the Unified Licensing Regime with expiration of the exclusively period of the main GSM network providers. The provision of unified license is to enable telecom operators provide fixed and mobile telephony, Internet Access as well as any other communication service they choose to offer.

These are some of the activities and programmes directed towards ICT development in the country. Other programmes and measures embarked upon are:

### **The Setting Up of Galaxy Company Plc**

The Federal Government has set up Galaxy Company PLC with a 9-man Board to harmonize broadband, VSAT and wireless technology in the country. It is aimed at providing a single national backbone over which all other services could ride so as to drastically reduce the cost of communication. This will ensure direct, faster and cost – effective communication, for a lot of communication will be done directly in the country instead of having to go to Europe first before returning to the country.

### **Computer for All Nigerians Initiative (CANI)**

The scheme is aimed at making computers more affordable and more accessible to Nigerians with fifty percent reduction in the prices of computers.



### Adoption of Space Technology

In furtherance of its objective of transforming Nigeria ICT capable country, the Federal Government has ventured into the area of Space Technology, another key ICT infrastructure. Two satellites have been launched in this regard i.e. the earth observation and the communication satellites.

The foregoing achievements are in tune with the action lines of the World Summit on Information society (WSIS) agenda towards achieving an all Inclusive Society and Millennium Developmental Goals.

**Table 3: Current Growth Statistics of ICT Infrastructures**

	Dec. 1999	Dec. 2002	Dec. 2003	Dec. 2004	Dec. 2005	June 2006
Number of Connected fixed lines	450,000	702,000	850,000	1,120,000	1,223,258	1,538,214
Number of connected digital mobile lines	None	1,594,179	3,100,000	9,200,000	18,587,000	25,142,956
Number of National carriers NITEL & GLOBACOM	1	2	2	2	2	2
Number of operating ISPs	18	30	35	40	60	90
Number of active licensed fixed line operators	9	16	30	17	20	27
Number of licensed mobile operators	1	4	4	4	4	10*
Private Investment	\$50m USD	\$2,100m USD	\$4,000m USD (est.)	\$6,000m USD (est.)	\$7,500m USD (est.)	\$8,150m USD (est.)

Source: Nigeria Communications Commission, available: [http://www.ncc.gov.ng/index5\\_e.htm](http://www.ncc.gov.ng/index5_e.htm)

\* Including operator with unified license who are licensed to offer fixed and mobile services.

It is clear from the above **Table** that ICT industry has witnessed tremendous growth between 1999 and June 2006. The most pronounced sector of growth is mobile communication with digital mobile lines growing from zero in December, 1999 to 25,142,956 in June, 2006 (NCC, 2006). Other growth indices include:

- Telephone subscribers, growth from 450,000 in December 1999 to 25,592,956 in June 2006.

- Increase in the number of National Carriers from one in 1999 to two in June, 2006.
- Increase in the number of licensed mobile operators from 1 in 1999 to 10 in June, 2006.
- Increase in the number of operating ISPs from 18 in 1999 to 90 in June, 2006.
- Private investment growth of \$50m USD to \$8,150m USD in June, 2006.

**Table 4: Total Connected Lines and Teledensity (December, 2001 – January, 2007)**

Operator	Dec. 01	Dec. 02	Dec. 03	Dec. 04	Dec. 05	Dec. 06	Jan. 07
Fixed	600,321	702,000	872,473	1,027,519	1,223,258	1,687,972	1,704,722
Mobile	266,461	1,569,050	3,149,472	9,174,209	18,587,000	32,322,202	33,603,761
Total	866,782	2,271,050	4,021,945	10,201,945	19,810,258	32,010,174	35,308,483
Teledensity	0.73	1.89	3.35	8.50	15.72	24.29	25.22

Source: Nigeria Communications Commission,  
available: [http://www.ncc.gov.ng/index5\\_e.htm](http://www.ncc.gov.ng/index5_e.htm)

**Table 5: Total Connected Fixed Lines (December, 2001–January 2007)**

Operator	Dec.01	Dec.02	Dec.03	Dec.04	Dec.05	Dec.06	Jan.07
NITEL	540,662	555,466	539,405	507,268	557,979	439,245	439,245
PTOs	59,659	146,534	333,068	520,251	775,279	1,248,727	1,265,477
Total	600,321	702,000	872,473	1,027,519	1,223,258	1,687,972	1,704,722

Source: Nigeria Communications Commission,  
available: [http://www.ncc.gov.ng/index5\\_e.htm](http://www.ncc.gov.ng/index5_e.htm)

The following facts can be deduced from Tables 4 & 5.

- The growth indices confirm the astronomical growth of Digital Mobile Lines, which have increased from 25,142,956 in June, 2006 to 33,603,761 in January, 2007.
- Total Telephone subscriber's growth from 25,592,956 in June, 2006 to 35,308,483 in January, 2007.
- Teledensity growth from 0.73 in 2001 to 25.22 in 2007.
- The number of fixed lines provided by PTO has almost tripled NITEL lines showing the impact of private investment fixed lines.

### Telecom Market Statistics in Nigeria

The statistics of Nigerian telecom market is staggering. For instance, there were 38,000,000 Mobile Cellular phones (As at April 2007); 1,549 internet hosts: (2006) and 5.6 million internet users (2006). The above statistics shows considerable mobile lines growth from 33,603,661, in January, 2007 (based on table 5) to 38,000,000 in April, 2007. Further, increase in the number of Internet users and hosts, an evidence of upsurge in the Internet usage.

**Table 6: Telecoms Subscriber Information (Year 2001 – April 2008)**

	Operator	2001	2002	2003	2004	2005	2006	2007	Mar - 08	Apr-08
Connected Lines	Mobile (GSM)	266,461	1,569,050	3,149,472	9,174,209	18,295,896	32,184,861	N/A	N/A	N/A
	Mobile (CDMA)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Fixed Wired/Wireless	600,321	702,000	872,473	1,027,519	1,223,258	1,673,161	N/A	N/A	N/A
	<b>Total</b>	<b>866,782</b>	<b>2,271,050</b>	<b>4,021,945</b>	<b>10,201,728</b>	<b>19,519,154</b>	<b>33,858,022</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Active Lines	Mobile GSM	N/A	N/A	N/A	N/A	N/A	N/A	40,011,296	43,786,542	44,932,181
	Mobile (CDMA)	N/A	N/A	N/A	N/A	N/A	N/A	384,315	567,185	734,444
	Fixed Wired/Wireless	N/A	N/A	N/A	N/A	N/A	N/A	1,579,664	1,545,984	1,538,438
	<b>Total</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>41,975,275</b>	<b>45,899,711</b>	<b>47,205,063</b>
Installed Capacity	Mobile GSM	N/A	N/A	N/A	N/A	N/A	N/A	76,545,308	79,625,308	85,125,308
	Mobile (CDMA)	N/A	N/A	N/A	N/A	N/A	N/A	1,540,000	3,170,000	3,170,000
	Fixed Wired/Wireless	N/A	N/A	N/A	N/A	N/A	N/A	6,578,303	5,676,481	5,679,377
	<b>Total</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>4,663,611</b>	<b>88,471,789</b>	<b>93,974,685</b>
	[1] Teledensity	0.73[2]	1.89	3.35	8.50	16.27	24.18	[3]29.98	32.79	33.79

Source: Nigeria Communications Commission, available:[http://www.ncc.gov.ng/index5\\_e.htm](http://www.ncc.gov.ng/index5_e.htm)

**Notes:**

- Teledensity was calculated based on population estimate of 126million people up till Dec. 2005; from Dec.2006, teledensity was based on a population estimate of 140m.
- Teledensity from 2001 to 2006 was based on number of connected lines.
- Teledensity for December 2007 was based on active subscribers.
- Total telephone connected lines growth from 866,782 in 2001 to 33,858,022 in 2006.
- Total number of active lines has risen from 41,975,275 in 2007 to 47,205,063 in April 2008. This confirms considerable growth in the telephone lines especially, Digital Mobile Lines.
- Teledensity growth from 0.73 in 2001 to 33.79 in April, 2008.

- A remarkable development is the entry of Code Division Multiple Access (CDMA) mobile lines into the telecom sector. These are mostly found in the South Eastern Nigeria.

However, this figure is small considering 140million population of Nigeria. This is an indication that perhaps the Internet usage in Nigeria is still largely elitist. It is hoped that the government will expedite action on the implementation of several other measures line up to boost Internet usage in Nigeria including extension to the grassroots.

### **School Net Nigeria/Education Tax Fund**

This is a National Organization with a mandate to integrate Information and Communication Technology (ICT) into the Nigeria Educational System. It is committed to effective use of ICT for enhancing teaching, learning and management processes in Nigerian Primary and Secondary Schools. Earlier efforts included embarking on Internet Project for teacher and technical training development with 35 rural sites (Daniel, 2003). These 35 sites are connected via VSAT: Seven in community centres to train teachers in different region; twenty-eight in secondary schools. The Education Tax Fund, Private Sector, Ministry of Education and Telecom Companies launched the School Net Nigeria in 2001. To date, School Net Nigeria has succeeded in placing Network of Computers in almost 120 secondary schools, a little over one percent of the total number of schools; yet the rate of ICT development was considered slow by the World Bank (Nigerian Tribune, Feb. 23, 2003)

Daniel (2003) also reported that besides working with School Net Nigeria, ETF was working on the Education resource centers project, which aims to create science labs, libraries and multipurpose halls, and that ETF is also providing funding to universities and other Institutions to improve education levels and standards as part of their centres of excellence project. Within this project, ICT and Education has been emphasized. Not just the Internet but also the use of audio and video. It is also working towards upgrading medical schools with the use of ICT to train doctors and share information. The goal is to improve performance and capability of doctors by using ICT.

### **Space Technology**

It is necessary, at this juncture, to highlight the efforts of the Federal Government of Nigeria in the area of space technology, another key ICT infrastructure, towards the socio-economic development and application of satellites in solving national problems and planning for overall national development. The following are examined below: Nigeria Communication Satellite (NIGCOMSAT); Tele-education/Tele-medicine; rural telephony; broadcasting services; earth observation satellite code; technology transfer; and virtual library.

### **Nigeria Communication Satellite Code (NOGCOMSAT-1)**

The first super hybrid communication satellite in Africa known as NIGCOMSAT -1 has been launched in May, 2007. This is to foster more effective communication not only in Nigeria but also the region of Africa. According to Boroffice (2004), communication satellites provide attractive solutions in telecommunications as they allow for immediate access to information resources both regionally and globally. The national communication

satellite is necessitated by high demand for VSAT, Internet and GSM phone services, which have generated enormous traffic to the extent that the existing networks are inadequate to carry, necessitating the use of satellite, based network. The satellite is aimed at improving the quality of Internet and telephone services most especially in rural areas and over all telecommunications.

The project on completion will provide a key ICT infrastructure that will provide coverage over Nigeria, Africa, Middle East and Europe. The projected revenue derivable from the project is \$440 per annum to be paid by African countries for their international telephone traffic out of the projected US \$1.2 trillion in the world telecommunications market. Thus, it will serve as a veritable source of revenue to Nigerian Government. Other applications of the satellite cover the following areas:

### **Tele-Education/Tele-Medicine**

NIGCOMSAT -1 is to serve as ICT infrastructure which is a backbone for tele – education and tele – medicine with a view to providing real time interactivity between the major campuses of tertiary institutions and remote campuses thereby increasing the level of literacy in the country. Tele – medicine, on the other hand, is a method of developing/or supporting new diagnostic and treatment procedures, and a tool for introducing changes meant to improve the way of delivery health care.

Already, a telecommunication network to link the headquarters of the National Open University in Lagos with twelve study centres in various parts of the country is in progress. This is to enable the twelve centres receive lectures and interact with the lecturers in Lagos real – time and simultaneously through video conferences. The tele-education network was practically demonstrated by President Olusegun Obasanjo at the official opening ceremony of the National Open University in March, 2007. The President had the opportunity of interacting with the students of the Open University in Abuja from Lagos.

Again, a tele-medicine network that will link University Teaching Hospital, Ibadan and University Teaching Hospital in Maidugiri with six primary Health Centres is also in progress. This will bring the experience of the two medical centres of excellence to hospitals in various parts of the country through video conferencing.

### **Rural Telephony**

This is another application of the national communication satellite. Through provision of rural telephony, there will be opening up of rural communities to various developments such as Internet, tele-education, tele-medicine, extensive farming etc. It is expected that the launch of NIGCOMSAT-1 will provide the much needed tele-communication services in the rural areas. A well planned and implemented VSAT network will drastically improve access to communication services (such as provision of power/energy through digital metering system) in the rural areas.

### **Broadcasting Services**

The broadcasting in Nigeria is a high consumer of bandwidth. Currently, there are more than 250 operational licenses in Nigeria. There are over 110 radio stations, 93 TV stations and 39 cable stations. The Nigeria Television Authority with about 60 stations has been able to attract significant revenue compared with other stations because of large coverage which satellite technology provides to NTA stations. It is hoped that the launch of NIGCOMSAT -1 will provide a stronger foot –print over Nigeria and Africa so that the NTA and other stations will be able to expand their coverage and thus boost their business and profits.

### **The Earth Observation Satellite Code (NIGERIASAT-1)**

This was launched in 2003 and it is reported to be doing well in the orbit, and have met over 250 requests for satellite data by researchers and students in Nigerian Universities. A large amount of revenue has been generated from the project.

The Nigeria's earth observation satellite is targeted at meeting government aspirations and economic reforms. These are satellites specifically designed to obtain data about the earth while in the orbit. A more powerful earth observation satellite known as NIGERIASAT -2 together with SAT X will be launched in either 2009 or 2010. This will address the shortcomings of the NIGERIASAT -1 and consolidate on its present achievements. Several applications of the earth satellite into the economic reform programmes include agriculture, land use and management towards provision of food security for Nigeria. It should be noted that all economic programmes have given agriculture a priority considering the fact that improvement in agriculture is one of the panaceas for food security and poverty alleviations in Nigeria. Other applications include exploration and exploitation of natural resources, disaster monitoring and management, deforestation, identifying areas of tourist attraction. Land use and mapping including the growth of cities and towns of Nigeria. Also the application of NIGERIASAT -2 for high way design and construction will render the use of area photo obsolete.

Data provided will enable the Nigerian Government pursue socio –economic development effectively. In fact, report has it that satellite data has been used to address the following national problems among others:

- Gully Erosion in the South East of Nigeria.
- Desertification in the Northern part of Nigeria.
- Deforestation in the South west of Nigeria.
- FADAMA land information system of rice grown and a lot more

On the international scene, Nigeria was part of global efforts that brought relief to victims of Tsunamis which struck and caused widespread disaster in some countries of Asia. NIGERIASAT -1 along with ALSAT -1 and UK-DLC in the disaster monitoring constellation captured the incident and provided satellite data imageries of the affected areas which were made available to RESPOND – European Agency that has been responsible for tackling the problem arising from Tsunamis.

### **Technology Transfer**

It is noteworthy that the NIGERIASAT -1 in Surrey, China was controlled from Nigeria and by Nigerian engineers and technologists trained by National Space Research and Satellite Development Agency (NASRDA) established by the Federal Government of Nigeria in 1999 to co-ordinate the development, research and formulate policies for Space – Science and Technology (SST) programmes in Nigeria. This is a breakthrough for Nigeria and it is expected that the experience gained from the project will be utilized in the manufacturing of SAT- X to be built solely by Nigerian Engineers in Surrey as a component of the NIGERIASAT -2 project.

One great advantage of this development is the fact that the technological know-how transfer programme as a means of bridging the digital divide being experienced by developing African countries is thus becoming a reality in Nigeria. Nigerians and over one hundred scientists have been trained in various aspects of space technology as well as its applications in South Africa, United Kingdom, Italy, Canada, Dubai, China, United States of America and Netherlands. Also, it serves as a source of employment for Nigerian Engineers and Technologists (NSRDA News, 2004).

There is no doubt that the adoption of space technology as a key ICT infrastructure is bound to transform Nigeria into IT capable nation and a key player in the information society.

### **Creation of Virtual Library in Nigeria**

Another laudable development in the country is the on going virtual library projects embarked upon by the Federal Government of Nigeria. These are the National Universities Commission Virtual Library and National Library of Nigeria Virtual Library.

Speaking on the importance of virtual library services, Okebukola (2002) explained that the propensity of the virtual library makes it possible for end – users to evaluate information on wider range. Adding that the system is called virtual because of its good network which enables the users to enjoy the euphoria of being at a distant place but have information outside his/her station.

The objectives of establishing the NUC Virtual Library according to him are:-

- a) To provide information for national development.
- b) To avail the nation access to global information.
- c) To make library and information centres effective for national planning and development, and fulfill the concept of Universal Availability of Publication (UAP) through resource sharing in Nigeria.

In addition, the project is also meant to support the Open University of Nigeria (NOUN) educational programme. It aims to establish 30 centres around Nigeria with auditoriums to hold about 100 students for lecture. The centres will also have libraries and computer work centres.

The National Virtual Library project attached to the National Library of Nigeria is an all-encompassing one. The Virtual Library Project is indeed very important, as it will provide

global access to very useful collections of bibliographic resources in the custody of the apex library and impact positively on other libraries most especially, the public libraries. To this end, there is the need for interconnectivity of libraries towards the formation of National Information Network to facilitate co-operation and collaborative efforts towards the task of nation – building.

### **Impact of ICT Programmes on Nigerian National Development**

The chief executive of National Communication Commission, Mr. Ernest Ndukwe underscores the importance of the various projects and programmes embarked upon by Nigerian Government to accelerate ICT development in the global village:

The new world order will be dominated by IT, the exchange of ideas where knowledge and information will be a major key to sustenance and survival of any country and only those country which implement the required communication policy and infrastructure will continue to define culture and information transfer as well as dominate political and societal view on issues and events. Therefore, Nigeria will leave no stone unturned in its efforts to manage, exploit and grow with the Internet (Ndukwe, 2001).

The reality of the situation has dawned on Nigerian Government and has come to identify ICT development as a national priority. In fact, the nation has started reaping the benefits in several ways. Thus, Federal Government has been able to fulfill some of its aspirations and economic reforms as embodied in the National Economic Empowerment Development Strategy (NEEDS), which in turn can be linked with global and continental initiatives i.e. Millennium Developmental Goals (MDGS), World Summit on Information Society (WSIS) and New Partnership for Africa's Development (NEPAD). NEEDS as a national agenda is centred on poverty reduction, which includes: strategy for creating an enabling environment for business to thrive in the country; and for basic services to be provided, for good health, education, housing development, employment, youth development, security, gender equality, industrial, agricultural development and technology transfer (Ayeni, 2006)

#### **(a) Expansion of Telephone Services**

Communication is an important aspect of existence as it enhances the value of information. Hence, information without effective means of communication is hopeless. Democratization of phone services through the weapon of liberalization has provided Nigerians with cheaper and effective means of communication. Most Nigerians i.e. Artisans, farmers, students, market women in urban, semi – urban centres and even rural areas now own mobile phones which enable them to communicate effectively nation –wide. Further reduction in the prices of mobile lines has, as a result of competition, made phone lines more affordable and accessible to Nigerians leading to widespread use of mobile phones. Phone lines are easily obtainable in a transaction that is devoid of time wasting associated with administrative bottlenecks. This is a fulfillment of government aspiration to extend phone services to underserved and un-served areas. Thus, widespread use of mobile phones has revolutionized social and business contacts in Nigeria. This was not the case before when the government mainly held about half of the telephone lines.



**(b) Explosion of Telecentres/Cybercafes**

Several tele-centres/cyber cafes abound in several cities and towns in Nigeria rendering Internet services. Thus, ICT infrastructure is also gaining inroad into the grassroots. With this development, Nigerians of diverse backgrounds now have access to multitude of information on the web for various purposes i.e. education, administration, commerce, banking and finance etc. Other applications of the Internet include communication via e-mail and real-time interactivity with people over long distances and across the Atlantic. Nigerians are thus reaping the benefits of this information super highway. This is in tune with WSIS agenda.

**(c) Employment Generation**

The ICT sector serves as an avenue for employment of Nigerians, skilled, semi-skilled and unskilled. Available record shows that more than, 10,000 Nigerians have been directly employed by the GSM companies while an estimated 1,000,000 people have been provided with means of self-employment through sales of recharge cards, opening of call and business centres etc. In fact, mobile phone services have assumed a very lucrative business in the country. Similarly, availability of numerous tele-centres, cyber cafés provide employment opportunities for Nigerians. Moreover, the space technology has provided some forms of employment to Nigerian Engineers and Technologists employed by NARSDA thus fulfilling an aspiration of MDGS and NEEDS.

**(d) Technology Transfer**

Nigeria has witnessed some form of technology know – how transfer particularly in the area of space technology as emphasized by MDGS and NEPAD. The Nigerian Earth Observation Satellite in Surrey, China was controlled from Nigeria and by Nigerian Engineers. Nigerian Engineers will build the NIGERIASAT-2 under the supervision of their foreign counterparts.

**(e) Partnership for Global and Regional Development**

The space technology has offered Nigeria the opportunity for regional and global partnership development. For instance, Nigeria is a member of the Disaster Monitoring Constellation Countries, which have transformed into DMC consortium. Other members are Algeria, China, Turkey and United Kingdom. The benefit for Nigeria in this connection is the recognition of her contribution to global management of disaster including 2004 Tsunamis disaster through the DMC arrangement, which is the world's first coordinated effort at disaster management, as well as Nigeria high profile in the space arena and foreign exchange earnings from satellite data.

Also, Nigeria has the privilege to join the Committee on Earth Observation Satellite (CEOS), an internationally recognized committee on Earth Observation. This is indeed a breakthrough for Nigeria and an affirmation of its position as the Giant of Africa.

**(f) Private Investment**

By creating enabling environment, the Nigerian Government has succeeded in attracting both local and private investors into the country, thus eradicating misuse of monopoly power as envisaged by its economic reforms. Several private telephone operators as well as quite a number of Internet Service Providers (ISPs) including domestic and international VSAT licenses are in operation. This is a booster to Nigerian economy and source of additional revenue for the Federal Government of Nigeria.

#### **(g) Revenue Generation**

Private investment is a veritable source of revenue to the Federal Government. Quite a substantial amount of revenue has been generated through spectrum and numbering fees, import duties and VAT. In the same vein, a huge sum of revenue is anticipated from the various projects embarked upon by the Nigerian Government most especially in the area of space technology.

#### **(h) Access to Global Information**

Creation of virtual libraries is another ICT project that is bound to stimulate national development. It is indeed a golden opportunity to address paucity of information on Nigeria on the web and thus contribute to global wealth of information. Prospects include digitization of library, archival and cultural repositories for preservation and world consumption; increased academic related activities leading to high quality tertiary education and widespread literacy. This is very important at a time when Nigerian students are experiencing book crises as a result of high cost of book production.

#### **(i) Improved Library Services**

The ICT projects are bound to impact on libraries since their activities now encompass application of information and communication technologies for service delivery. Today, library networking is on the increase paving way for exchange of information and resource sharing between libraries, archives and information centres world wide. The establishment of Digital Bridge Institute will address the much needed capacity building for libraries

### **Conclusive Remarks: ICT - the Way Forward for Nigeria**

It is obvious from the above that the Federal Government of Nigeria particularly, Obasanjo's regime has put Nigeria on the path of greatness ICT wise. Therefore, Nigeria is set to be a key player in the emerging information society and the dominant player in the African Information Society. However, there is still much room for improvement. Even though there is upsurge in the usage of Internet in Nigeria, the number of Internet users is still very small when juxtaposed with 140 million population of Nigeria. Furthermore, Nigerians are still faced with the problems of poor Internet and phone services. What is more, there are numerous organizations in Nigeria both public and private rendering various services. Regrettably, one can count on the fingertips organizations that have become fully automated. Apart from the banking sector that has become ICT driven including the introduction of ATM machine, to supplement their services, several organizations are still automating. Worthy of note are libraries, which have a vital role to play in national

development through provision of information services. Libraries require the support of all tiers of government to function effectively and efficiently. Automation and networking of libraries should be the top priority of Nigerian Government.

Nigeria has recorded remarkable progress in the ICT sector leading to some socio-economic development. It is desirable to place on record the dogged commitment of Obasanjo's government to ICT development. No other government has contributed more to the development of the sector than his regime. Now that his regime is over, it is imperative that the new government and subsequent ones consolidate on these achievements. This is very important considering the fact that inconsistency in government policies and lack of continuity occasioned by frequent change of power has been one of the drawbacks of Nigerian development. The new government should regard the sustainability of the ICT programmes/projects as National imperative. For instance, it is sad to note that the NigComSat1 launched barely 18 months ago has failed. The present Government need to do every thing possible to resuscitate it.

There is the need for further reductions in the prices of computer to enable more Nigerians procure Personal Computers (PC) as well as training of more experts in ICT. The choice of Nigeria as the first campus of the African Institute of Science and Technology, which is the initiative of Nelson Mandela Institution for Knowledge Building and Advancement of Science and technology in Sub-Saharan Africa (NMI) is highly commendable. NMI aims to turn out experts in Science and Technology that will provide solutions to science and technological problems of the continent.

All the universities of science and technologies in the country should be well equipped with more emphasis on practical to enable them turn out experts in science and technology. The virtual library projects should be well funded and well equipped. They require stable power supply to function very well. The government should address itself squarely to the problem of epileptic power supply in the country, in addition to the provision of stand by generators.

The importance of ICT in nation building cannot be over emphasized in view of the fact that this is an information age ushered in by the ICT revolution. It has assumed a veritable instrument of national development and a means of attaining international relevance. Therefore, any nation that fails to adjust to the new epoch cannot sustain its relevance in the global village. African countries must endeavour to catch up with the developed nations ICT – wise. Against this background, the efforts of Nigerian Government towards acceleration of ICT are highly commendable. More programmes/projects should be executed. Finally, all the suggestions above should be heeded and implemented.

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