THE INTERNATIONAL JOURNAL OF HUMANITIES & SOCIAL STUDIES

Information Infrastructure in Nigeria: A Review

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Abstract:
The study examines information infrastructure in Nigeria. To do this, documentary research was applied. The concept of information infrastructure was looked at, infrastructure in Nigeria was examined, and types of information infrastructure like television, library, publishing industries, telephone, and the internet were discussed. Further, roles of libraries and librariansin the development of information infrastructure such as training for ICT, provision of services to the community, and provision of different database among others as well information infrastructure policy were identified. Weak policies, few ICT infrastructures, slow development of the library in Nigeria were identified as some challenges of information infrastructure development in Nigeria. The study recommended among others comprehensive information infrastructure polices, provision of broadband, increased financing of all types of libraries by the government and development of local content software and hardware.

Keywords: Infrastructure, information infrastructure, policy and library

1. Introduction

As the amount of information grows, so does the challenge of providing information to those who need it. No group is more aware of this than librarians, who have been trying to collect, organize, and disseminate recorded knowledge for centuries. Information once obtained primarily through books, periodicals and other print materials is now available in additional formats, such as videocassettes, audiocassettes, microfilm, laser discs, DVDS and the worldwide web.

If the library is to continue to collect, organize, and disseminate information on demands, it is vital that the way information flows in our society be understood. Only then can libraries exploit the ever-expanding information resources and channels and serve the information needs of library users. Today, such and understanding comes, in part, from the realization that the library is a member of a much larger structure: the "information infrastructure". An infrastructure is both a foundation and a framework, much the same as the infrastructure of a house includes its foundation and frame. Without such a structure the house would collapse. Societies have a variety of infrastructures. For example, the United States has a transportation infrastructure that is necessary for efficient travel. This includes highways, train tracks, air routes, and waterways. It also includes the governmental agencies that regulate transportation.

An information infrastructure is in many ways like a transportation infrastructure, except that the "traffic" is information rather than modes of transportation. An information infrastructure makes it possible for information to be created and disseminated. Information infrastructures vary greatly in their sophistication: some are very primitive and inefficient; others are highly advanced and efficient. As might be expected, the information infrastructure is advance and complex, and libraries are but one part of it. This is not to diminish the role libraries, but to show that the libraries are part of the information infrastructure.

1.1. Objective

The study is guided by the objective below:
To examine information infrastructures in Nigeria; types, policies, and challenges

2. Methodology

In this study documentary research was applied. Documentary research method refers to the analysis of documents that contain data about the phenomenon under study. Previous studies were used to collect data and there was

much reliance on description and interpretation of data rather than collecting raw data in accordance with Glenn (2009).The documentary research method was used in investigating and categorizing physical sources, most commonly written and non-written documents, whether in the private or public domain as stated by Harelimana (2015).The data inclusion criteria depended on; authenticity, credibility, representativeness and meaning attached to evidence (Ahmed, 2010).Most of the obtained data was from; books, brochures and minutes of meetings, electronic journals, press releases, diaries, background papers, event programs, letters and memoranda, and newspaper articles.

3. Review of Literature

3.1. Concept of Infrastructure

Infrastructure generally can be basic facilities and capital equipment needed for function of a particular thing, it can an area or even a nation. Infrastructure can broadly be defined as long-term physical assets that operate and enable the provision of goods and services to people in a society (New Zealand Social Infrastructure Fund, 2009). In the view of Babalola (2013), infrastructure generally refers to the basic installations and facilities on which the continuance and growth of a community or state depends. Infrastructure can be classified into social, economic, technological, scientific, information infrastructure and the likes. Social facilities like roads, railways, telecommunication networks, electricity supply system and water supply system are all described as infrastructure.

Infrastructural facilities have supporting and enabling functions and are shared by a large community of users. When you look at Social infrastructure, for instance, are a subset of the infrastructure sector and typically include assets that accommodate social services, which may include schools, universities, hospitals, prisons and community housing. Social Infrastructure does not typically extend to the provision of social services, such as the provision of teachers at a school or custodial service at a prison. In contrast, economic infrastructure for instance supports economic activity and is often characterized by user-pays or demand-based revenue streams (such as tolls on toll roads or landing fees for an airport) (New Zealand Social Infrastructure Fund, 2009).

3.2. The Concept of Information Infrastructure

From the traditional perspective of the information cycle, the information infrastructure consists of institutions and individuals involved in a linear process by which information is created, disseminated, and used in the society (Rubin, 2004). Furthermore, information infrastructure as viewed by Babalola (2013) noted that the concept of infrastructure has been used along with information to denote the information resources, networks, computers, software, developers, and producers which support the creation, transport, storage and use of information. To Babalola, information infrastructure denotes socio-technical systems composed of hardware, software, information content, human experts and network standards that facilitate information creation and exchange.

From another angle, Igwe (2012) opined that information infrastructure consists of various capabilities, both manual and digital, for making information and knowledge available and accessible as well as for the transfer and use of information and knowledge for the actualization of aims, objectives and needs of individuals and organizations in the society. Information infrastructure has various elements that are expected to be in place for the realization of its mission. They include libraries and documentation institutions, information and knowledge centres, librarians and other information practitioners, research and development establishments, higher institutions and researchers, organizational system for coordination, communication channels, and relevant supportive national policies that support the development of information infrastructures. The aggregate of all information infrastructure elements is expected to facilitate access to information and knowledge for the satisfaction of information needs of the citizens.

3.3. The State off Information Infrastructure in Nigeria

Publishing for instance is a private affair in Nigeria. The Nigerian Publishers' Association (NPA)--the main professional body for Nigerian book publishers--was established in I965. Primarily through lack of will on the part of the Federal Government, Nigeria has neither a National Book Policy nor a National Book Development Organization or Commission, explaining why indigenous book development has been unplanned and uncoordinated. An estimated 90% of the annual output of books published in Nigeria is in the area of textbooks for primary and secondary education. This results in lopsidedness in favour of primary and secondary school texts and against tertiary education (including polytechnics, colleges of education, and universities). It also militates against the availability of professional books, reference books and general books (including creative writing, general interest books, and books for lifelong education).

A Ministry of Communication Technology was created a couple of years ago and the following Agencies have been brought under its purview: NCC, NITDA, and NIPOST. Two Limited Liability Companies wholly owned by government; NigComSat and Galaxy Backbone have also been brought under the Ministry (National ICT Policy, 2012) The government, through National Information Technology Development Agency (NITDA) has made frantic efforts to establish and develop a National Information Infrastructure (NII) 'backbone' as the gateway to the Global Information Infrastructure (GII) interconnecting it with State Information Infrastructure (SII) and the Local Information Infrastructure (LII). It is quite unfortunate that a leadership direction and vision to guide IT infrastructure development has not been provided. There is no equitable access to all users and stakeholders and there is no guarantee for a private, faithful, accurate, confidential, secure, available and quality of personal information.

The National Library of Nigeria came into existence by the National Library Act passed in September, 1964. This Act was later replaced and substituted with the National Library Decree No 29 of 1970. It is a grade "A" parastatal and the

apex library in the country. It is the giant memory of the nation, her intellectual store house and data bank for learning and remembering process. It is the Vanguard of library development and information services delivery, advising institutions, organizations and MDAs at all levels of government on library development. Other libraries like academic libraries, public, school and private libraries are also in existence in Nigeria to help meet information need of the masses. But unfortunately, as pointed out by Aina (2004), the pattern of libraries in Nigeria hardly serve the rural dwellers such as artisans and farmers that are barely literate and constitute a substantial majority of the country's population; thus describing that development of library and information services in Nigeria is defective as it is geared towards a tiny minority of the society.

3.4. Information Infrastructure Policy in Nigeria

Policies are directives that shape decisions and actions of individuals, organizations, and government agencies McClure, and Jaeger, (2008);they are usually based on past experiences and give guidelines on present and future endeavors. This paper examined Information policies related to technological infrastructure focus on developing markets and diffusion of the technologies; those related to legal infrastructure focus on protecting the use of information resources with legal provisions such as privacy and intellectual property right while the policies that focus on human infrastructure aim to provide training and encourage consumption.

3.4.1. Information Technology Infrastructure Policy

National Information Technology Development Agency (NITDA) was established as the agency to implement the national ICT policy in collaboration with the Nigerian Communications Commission (NCC). NITDA is to develop and regulate the Information Technology sector in Nigeria, develop a critical mass of IT proficient and globally competitive manpower, ensure that every Nigerian is empowered with information technologies and ensure that IT resources are readily available to promote national development. Ajayi (2003) and Olatokun (2006) outlined some of the projects that NITDA undertook in order to fulfill its mandate:

3.4.2. Public Service Network

The goal of this project is to provide an ICT infrastructure that will enhance Internet access in the country. The core of the infrastructure is a Very Small Aperture Terminal (VSAT) sited in the Federal Capital city. The VSAT is to provide internet access to the State Capital as well as other sites around the country through Broadband Wireless Access (BWA) while the various locations are connected to each other with the Virtual Private Network.

3.4.3. Mobile Internet Units (MIUs)

These are buses that are equipped with computer systems, printers, scanners, digital cameras etc. and connected to the internet and converted into a mobile training and cyber center. The MIUs were constructed to serve as mobile tele-centers for carrying ICT education and Internet awareness to the rural communities in the six geopolitical zones of the country.

3.4.4. Human Infrastructure

Development of human resources in Information Technology is a pivotal goal of NITDA. NITDA initiated various programs targeted at people in different groups and sectors such the youths, professionals, civil servants etc. Some of these initiatives were executed in partnership with private and multilateral organizations such as UNESCO, International Centre for Theoretical Physics (ICTP) and Cisco Systems. The Digital Bridge Institute established by NCC in 2004 also made remarkable efforts in terms of human IT capacity development.

3.4.5. Legal Infrastructure

In addition to ensuring the integrity and preservation of data and information, information policies also help to protect individuals and organizations that create or use information. The need for such legal framework has become critical with increase in electronic transactions such as e-banking, e-commerce and e-business and the corresponding rise in cybercrime. Cybercrime constitute a global challenge and nations and multinational organizations are formulating policies and enacting laws to combat the menace. The Nigerian information technology policy clearly states the nation's commitment to protection of individual privacy as well as data protection. In line with this statement, the first draft of the Computer Security and Critical Information Infrastructure bill was produced in 2005 (Akinsuyi, 2010).

3.5. Types of Information Infrastructures

Information infrastructures are the basic physical and non-physical structures that support creation, dissemination and use of information. Below are some of the information infrastructures.

3.5.1. Libraries

The information infrastructure is a complex and dynamic environment. The role of libraries within this context is also dynamic. Traditionally libraries were part of this infrastructure long before electronic information technologies were even conceived. They have been a constant source of information in all part of the world. Like in the United States today, there are more than 117,000 libraries: 9,445 are public libraries, 3,480 are academic libraries, 10,452 are special libraries, and 94,342 are school or media centre libraries (American library directory 2002; Digerst of Education Statistics 2002). Suffice it to say here that libraries have played a role in the infrastructure largely by providing institutional support to

individuals or small groups through the provision of services and materials for educational, informational, and recreational purposes.

Historically, libraries have been an especially important channel of exposure to books, promotion of reading, literacy and self-development within the population.   In addition, the contemporary library integrated many other information channels in its continuing mission to meet the needs of its users. Most libraries are actively engaged in developing electronic information links and introducing electronic information technologies to their users. In this sense, they are evolving, becoming part of the larger national information infrastructure. The complex interrelationships among the various components of the information infrastructure present many challenges that libraries must meet if they are to prosper. Some have predicted that libraries may be coming to an end, which their electronic competitors will render them obsolete.   But according to American library directory, as of 2003, they were 30, 903 libraries (American Library Directory,2003).

From this perspective, the prediction seems unconvincing. One might predict that with the development of electronic access, libraries will become even more popular as information seekers look to libraries and librarians as important sources of expertise and assistance in an ever more complex information environment. Only time will tell.

3.5.2. The Internet and the World Wide Web

The development of the internet and the World Wide Web has had a profound effect on the way we communicate. Data provided by the United State Department of commerce (2002) suggest that the role of these resources is dramatic and wide ranging and that there continues to be an important digital divide. In 2001 there were nearly 143 million internet users in the United State alone, with 2 million more being added each month. In addition, internet use in increasing for people regardless of income, education, age, race, ethnicity, or gender. Since 1997, for example, use of the internet has grown for Africa-Americans from 13 percent to 40 percent; for individuals with a less income. Not surprisingly, young people are heavy users of the internet. 69 percent of children ages 9 to 17 use the internet. From 1998 to 2001 there has been an increase in the use of internet among children.

The reasons for using the internet are various. For example, 84 percent employ it for e-mail, 67 percent for product or services information; 62 percent for news, weather, or sports information; 42 percent play games; 39 percent use it for purchase products; and 35 percent search for health information or practices (United State Department of Commerce, 2002).

Taking an even broader perspective, Horrigan (2003) reporting for the Pew Internet and American Life Project concluded that there is a technology elite in the United States who are described as high-end technology adopters. These adopters are consistent users of the Web, cell phones, digital videodisc players, and personal digital assistant.

3.5.3. The Print Industry: Books

 Records have been around since the invention of written language (on stone, clay, vellum, papyrus) and print materials have been around since printing. Printing in china predates printing in the West. After the printing press was developed in the West in Germany in the mid-1400s, the influence of print materials vastly increased. (Martin Luther used the printing press quite effectively in stimulating what was to become the Protestant Reformation). Book sales, for example, have grown from 16 billion in sales in 1992 to more than 26 billion in 2001, with compounded growth rates of about 5 percent per year. The time spent reading books remains at around 100 to 120 hours per person per year between 1997 and 2002 and is expected to remain within this range through 2007 (Veronis, Suhler, and Stevenson, 2003).

It is worth noting that the electronic equivalent of the book, the e-book, is also beginning to establish itself after a slow start, and is becoming a significant force in the electronic publishing industry. It can be described simply as the electronic contents of a print book that is converted into electronic format, or it can be construed more broadly as any monograph or document that is available electronically. Certainly, as the e-book market expands and grows more sophisticated, it is likely that it will move beyond the conversion of already-published books into electronic formats, to works that are produced originally and exclusively in an electronic medium.

3.5.4. Periodicals and Newspapers

Periodicals are approximately a million periodical articles published every year in the United States. Consumer periodical circulation spending rose about 1 percent in 2002, although the number of subscriptions remains steady and the number of individual-issue purchases has declined slightly. Still, new periodicals continue to be introduced, with 290 appearing in 2002 (Veronis, Suhler, Stevenson, 2003). Historically, the newspaper has been a popular source of print information. Consumer spending on newspapers has risen from $10 billion in 1997to $11.4 billion in 2002. Individuals spent an average of 186 hours reading the newspaper in 1997 and 176 hours in 2002 (Veronis, Suhler, and Stevenson, 2003).

3.5.5. Telephones

The importance of telephone cannot be underestimated in the history of communication and in the contemporary world. More than 94 percent of all household in the around the world have telephones. The amount of information transmitted from one individual to another is undoubtedly great, and the growth of conference calls merely increases thin volume of information. In addition, what makes telephone access even more important today is that the telephone lines are now used for telecommunication with computers and databases. Over these lines are transmitted e-mail, web sites,

and interactions with computer databases for search purposes. The telephone and its infrastructure still represent crucial underpinnings for the computer information revolution (United States Bureau of the census 2002).

3.5.6. Database Industry

Over the last decade, access to electronically stored information in computers has been increasing regularly (Williams, 2003). As might be expected, the number of database producer continues to increase. In 1975 there were 200 database producers, compared to 4,042 in 2002. Predictably, as the information increases, and the number of vendors and producers remains high, the number of electronically stored records has increased greatly. In terms of the type of databases available, Williams reports that most (74 percent) are word-oriented (bibliographic or full test). This shift is testimony to the fact that computer databases as information channels are improving substantially in the extensiveness of the information available. With the increasing sophistication of digitization and the ubiquity of the Web, full-text and image-based databases are bound to grow.

With the rapid expansion of personal computers, access to electronic information has become commonplace. There can be little doubt that, at least for billions of people are having access to information. In fact, one can easily foresee that most people awash in information, will drown in it, or at the least lose their bearings. Perhaps that is why the term navigation has become so popular in attempting to assist people along the information highway. Nonetheless, one cannot consider the information context in which libraries are placed without recognizing the importance of computerized access to electronic data. it is not unreasonable to presume that librarians will become expert navigators for future information seekers

3.5.7. Television

One cannot avoid the omnipresent television. The number of households owning television is only slightly fewer than those with radios. One hundred and one million households have 245 million television sets, which accounts for more than 98 percent of all households. (U. S Bureau of the census, 2002).Television, like radio, provides information in many different formats including traditional news programs, special informational programming, and talk shows. One might debate the quality of content in many of these sources, but one cannot ignore that people draw much information from the television. In 2000, women were the heaviest users watching the television 4 hours and 46 minutes a day; men watched 4 hours and 11 minutes (International Television and Video Almanac 2003). Broadcast television is also being affected by the transformation of its signal from analog to digital. The development of the Videocassette and DVD has also meant that the TV is being used in a new way for information as well as entertainment. There can be little doubt that home video and DVD consumers use, including on-demand video, will continue to grow, which will put constant pressure on the use of movie theatres.

3.6. The Roles Of Libraries And Librarians In Building Nigeria's Information Infrastructure

Libraries and librarians have key roles to play in ensuring effective implementation of Nigeria's information infrastructure policies. According to Babalola, (2013) the roles include:

- First, in order to help bridge the digital divide, libraries, especially the public libraries could serve as community access points for Information and Communication Technology (ICTs).
- Second, librarians could provide Information and Communication Technology (ICT) training for people and help them take advantage of the numerous online information services for their personal development.
- Third, in order to make government information easily accessible to the people, librarians can help to classify and catalogue such information.
- Fourth, they can also develop databases on different fields of study, including job databases.

3.7. Challenges Facing the Development of Information Infrastructure in Nigeria

According to Egoeze et al, (2014) the following are the challenges faced in the development of information infrastructure in Nigeria:

3.7.1. Policy, Legal and Regulatory Framework

Presently in Nigeria, Policies guiding the Information and Communication Technology (ICT) and information sector are treated under various legislations. These laws are however not comprehensive enough to deal with convergence, global best practices and other Information and Communication Technology (ICT) related issues in the current digital world.

3.7.2. Information and Communication Technology Infrastructure

The paucity of Information and Communication Technology (ICT) infrastructure such as computer, Local Area Network (LAN), Wide Area Network (WAN), hub, printer, scanner, television, fax, codec camera, projector, radio, Video CD, audio tape players and microphone, in the country has greatly hindered the provision of efficient and affordable ICT services and information to the citizens, because they are insufficient.

3.7.3. Internet and Broadband

Internet and Broadband have been globally acknowledged as the foundation for transformation to the knowledge economy. Broadband has the potential of enabling entire new industries and changing how we educate our children,

deliver health care, manage energy, ensure public safety, engage government, and access, organize and disseminate knowledge. The internet and broadband provision in the country is very poor. Thus, making access to information difficult.

3.7.4. Local Content Development

Local content (including software and hardware) is grossly underdeveloped in Nigeria. This has resulted in over-dependence on the foreign importation of software and hardware and diminished opportunity for capacity building in Information and Communication Technology (ICT) content creation. In addition, there has been the related drain on the Nigeria's foreign exchange.

3.7.5. Library Development

The development of libraries in Nigeria is moving in a snail manner. It is painful that the public, private, academic, and school libraries are not well developed in Nigeria. Access to them is also an issue. Only privileged have access to libraries in Nigeria. Rural dwellers are excluded from the use of the libraries, because there is no provision for them. Looking at the library, it is an information infrastructure that is supposed to available for all (Egoeze et al, 2014).

4. Conclusion

Information infrastructures are the basis for the creation and dissemination and use of information. Without information infrastructure, information production, distribution and use will not be possible. In our information age today, information and communication technology infrastructures are fast growing, paving way for information provision and access. It is worth to know that the library as part of the information infrastructure is so important especially in developing countries like Nigeria. Thus, it is an information infrastructure that need complete attention. The development of information infrastructures in Nigeria is still behind as we are still struggling with challenges of political instability, corruption and lack of policy implementation that will help lay a solid foundation for well-developed information infrastructures in Nigeria.

Finally, without information infrastructure in a country, the production, distribution and use of information by individuals and governmental agencies will be drastically affected. This is because; an informed nation will definitely be a developed nation.

5. Recommendations

Based on the critical study of information infrastructure in Nigeria, the following are recommended:

- Policies guiding the Information and Communication Technology (ICT) and information sector should be comprehensive enough to deal with convergence, global best practices and other Information and Communication Technology (ICT) related issues in the current digital world.
- The development of libraries and attention given to them should take another turn. More financial assistance should be provided by government for the development of all types of libraries and access to libraries should not be limited to certain set of individuals.
- Local content in terms of hardware and software should be done in Nigeria rather than depending on foreign countries for substandard soft and hard wares.
- There should be increase in Information and Communication Technology (ICT) infrastructure such as computer, Local Area Network (LAN), Wide Area Network (WAN), hub, printer, scanner, television, fax, codec camera, projector, radio, Video CD, audio tape players and microphone, in the country and provision of efficient and affordable ICT services and information to the citizens.
- Government and stakeholders in Should work together to increase the poor Broadband in the country.

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