*International Journal of Education and Development using Information and Communication Technology (IJEDICT),* 2016, Vol. 12, Issue 2, pp. 4-25

# 2015 Global Information Technology Report: Consequences on knowledge management in higher education institutions in Nigeria

**Nwachukwu Prince Ololube**
**Ignatius Ajuru University of Education, Port Harcourt, Nigeria**

**Comfort Nkogho Agbor**
**University of Calabar, Calabar, Nigeria**

**Nanighe Baldwin Major**
**Niger Delta University, Wilberforce Island, Nigeria**

**Chinyere O. Agabi and Worlu I. Wali**
**Ignatius Ajuru University of Education, Port Harcourt, Nigeria**

## ABSTRACT

This research is a continuation of a theoretical review that evaluated ICT Policy Outcomes for National Development in relation to Networked Readiness Index (NRI) and the impact it has on knowledge integration and management in higher education institutions in Nigeria. A new dawn in information technology (IT) has initiated new trends in educational processes and have deeply changed traditional methods of doing research, teaching and learning experiences of both faculty and students in higher education institutions (HEIs) around the world. A survey research method was adopted and a questionnaire was structured along the 2015 Global Information Technology Report. The items were adapted and modified to shape into the purpose of this study. The study found that the eagerness and passion for IT and the role it plays in knowledge management (KM) are thwarted because Nigeria is faced with insufficiency in critical IT policies, infrastructures, usage, personnel, deficit in funding and essential services. This study recommends that higher education in Nigeria must become proactive, liberal, constructive and down to the business of research, teaching and learning using components of IT to enhance KM. This learned academic discourse has implication for higher education management and administration, policy making, and the government.

***Keywords:*** *NRI, IT, Higher Education, Policies, Administration and Management, Knowledge Integration, Management, National Development, Nigeria.*

## 1. INTRODUCTION

As information technology (IT) advances strongly in the 21st century, higher education institutions (HEIs) have witnessed great changes in their traditional role of knowledge dissemination. The combination of IT resources such as the Internet, projected equipments, web-based resources, and PowerPoint software into the instructional methods (Lu & Cheng, 2012), and the number one factor with its complex set of connections presents increasingly innovative services that have major consequences in the processes of knowledge management (KM) in higher education (Ololube, Kpolovie, Amaele, Amanchukwu & Briggs, 2013). The methods that guide knowledge integration according to Gupta and Bostrom (2009) and Lu and Cheng (2012) are the use of computer-based and web-based learning

technological instructions adopted by HEIs in processing and organizing their information and communication needs.

The promotion and development of knowledge society through IT tools is one of the deliberate plans that is gradually approved in recent times by HEIs globally to progress and support economic growth and development (Agabi, Agbor & Ololube, 2015; Ololube, Ubogu & Egbezor, 2007). Significantly, HEIs worldwide are burdened with the task of developing knowledge societies (Goddard, 2005; Akuegwu et al., 2011). Consequently, countries in the west have been upbeat towards increasing tactics to impel efforts aimed at providing HEIs the opportunity to bring uniformity and achieve knowledge parity for students (Altbach et al., 2009). However, notwithstanding the advances in IT, HEIs in developing economies are still faced with multifaceted challenges in their academic programming and reaching the goals of supporting the development of knowledge societies (Tremblay et al., 2012).

The low IT literacy rate in many HEIs in the sub-Sahara is a major concern and has impacted on the way other counties of the world are viewed (Phelps, 2002; Ololube et al., 2013). IT literacy rate in the context of this paper is the capability (knowledge, proficiency and ability) of stakeholders in HEIs to identify, explore, presents and diffuse information in order to collect knowledge and develop the culture of learning to be critical and self-critical, and learning to create knowledge (Agabi et al., 2015). The ability to generate new knowledge is the ability to be able to create knowledge based on one's own experiences and creating knowledge where none exist (Ololube, 2012; Zeng & Yunkuo, 2014). These efforts have set the ball to roll in our conducts in life because IT has transformed and impacted on educational methodologies in HEIs globally (The Economist Intelligence Unit, 2008).

Advancement in technological innovation is steadily becoming a hallmark of academic research, teaching and learning in HEIs. However, it is significant to inform that the changes taking place in HEIs is not extensive and there is the need to reinforce IT penetrations to reach greater percentage of students and faculty members (Ifinedo, 2005, 2006).

The globalization of higher education and the efforts at creating knowledge societies through IT include components of network connectivity, computer hardware and software, and several other strategies critical to achieving valuable KM (Agabi et al., 2015). IT components have provided modern opportunities for teaching, learning, research and direction in HEIs (Lopez, 2003).

KM models are enormously vital to guarantee successful national development of Nigeria's economy and society (Agabi et al., 2015). The approaches involve the process of including novel information into an existing body of knowledge by applying several approaches (Bellinger et al., 2004). The said processes and approaches entail the determination of how new information and the existing knowledge interrelate with each other, how an existing body of knowledge should be made to other to accommodate new information, and how new information should be structured to reflect existing knowledge (Cárdenas, Al-Jibouri, Halman & van Tol, 2013).

Knowledge management (KM) has over the years emerged as a field and have been seen as central to practice, teaching, learning and research in information technology (Chong & Choi, 2005; Magnier-Watanabe, Benton & Senoo, 2011). The field of KM is built on the theoretical foundations of information systems, information economics, strategic management, organizational justice and culture, organizational behavior and structure, artificial intelligence, quality Management models, organizational performance measurement, knowledge societies and economy, knowledge alliance and culture, knowledge organization, knowledge infrastructure and equity, and knowledge governance, including teaching, learning and research (Baskerville & Dulipovici, 2006).

KM promote factors that lead to better performance, improvement, creativity, efficacy and effectiveness, including the quality of production, goods and services in organizations. To effectively manage knowledge and integrate such knowledge in organizations, there is need to rely on basic conceptions and paradigms that are theoretically all-encompassing, which covers the most significant and imperative areas of KM, and are applicable to organizations (Agabi et al., 2015).

The Nigerian national policy on education (FRN, 2013) conceptualized HEIs to mean post-secondary education given in universities, Polytechnics, Colleges of Education and Monotechnics, as well as those organization offering correspondence courses. IT is seen as a crucial element towards the move for knowledge integration (Agabi et al., 2015; Ololube, 2015). However, IT use and its diffusion into research, teaching and learning in HEIs are dependent upon the available resources, which are heavily dependent on government policies and the political environment (Ifinedo, 2005). These policies and the political atmosphere has imposed gaps in addressing novel ideas in IT management (Ololube, 2009), free enterprise, development problems, strategic planning and the digital divide in Nigerian academic landscape especially in HEIs (Cárdenas et al., 2013). IT researchers (e.g., Mac-Ikemenjima, 2005; Ifinedo, 2005; Ololube, 2009; Dakwa, 2010; Cárdenas et al., 2013; Agabi et al., 2015) belief that IT comes with several benefits, as such, has a lot to offer towards knowledge integration, management and creation. However, Dakwa (2010), Ololube et al. (2013) and Yusuf, Afolabi and Loto (2013) argued that the government of Nigeria has failed on numerous occasions to deliver on her IT policies in line with international best practices, because a great deal of time and efforts has been and is still endowed in developing policy guidelines, instead of effectively implementing existing IT policies and programmes aimed to elevate and position Nigeria in the global academic community.

### 1.1. Purpose of the Study

The purpose of this study is to appraise faculty (lecturers) perceptions concerning the 2015 Global Information Technology Report for Nigeria in relation to Networked Readiness Index (NRI), its consequences on KM in Nigeria, and to investigate if the NRI indicators are the same as perceived by the Global Information Technology Report for Nigeria. Despite studies confirming the importance of KM to HEIs, national and global development (e.g., Yusuf et al., 2013; Agbeja & Fajemisin, 2008; Sridharan, Tretiakov, & Kinshuk, 2004), the perception among some professionals in Nigeria who say the perceived impact of IT is not related to KM, rather they see KM to be tied to interest in IT. As a result, there is need for investigation to ascertain if the indicators (infrastructure, affordability, skills, usage, social impacts) are responsible for KM in Nigeria higher education environment. This study offers new perspectives into the varied reasons that support the use of IT for KM and further addressed the intellectual gap in Nigerian faculty to understand the consequences of IT on KM.

### 1.2. Hypotheses

To understand the basis for this study, the study addressed the five under listed hypotheses:

$H_1$: The perceived 2015 Global Information Technology Report for Nigeria on IT infrastructure is not significantly related to KM in HEIs.

$H_2$: The perceived 2015 Global Information Technology Report for Nigeria on IT affordability is not significantly related to KM in HEIs.

$H_3$: The perceived 2015 Global Information Technology Report for Nigeria on IT skills are not significantly related to KM in HEIs.

$H_4$: The perceived 2015 Global Information Technology Report for Nigeria on individual IT usage is not significantly related to KM in HEIs.

$H_5$: The perceived 2015 Global Information Technology Report for Nigeria on IT social impacts are not significantly related to KM in HEIs.

## 2. THEORETICAL EVALUATIONS

### 2.1. Theory of Knowledge Management

### 2.2. IT and KM

As humans we are challenged with the need to resolving our daily problem in life and in academics. The knowledge we possess and the capability to make the most of the appropriate information in our daily lives require meeting some certain task. Taking strategic decision involves sharing of knowledge among colleagues during teaching-learning processes. Basically, knowledge refers to the understanding an individual has about information, and the integration and management of knowledge is a comprehensive process, which includes all the procedures that allow for knowledge capitalisation in higher education (Oladejo & Osofisan, 2011). Information technology (IT) literacy has been recognised to influence the search for relevant information to solve our daily and academic problems, but are limited by insufficiency in critical IT policies, infrastructures, usage, personnel, deficit in funding and essential IT services (Ifinedo & Ololube, 2007).

The acceptance and use of IT to boost KM processes is valuable for higher education in positive ways—enhancing and enabling, and in negative ways—blocking and frustrating methods. However, IT can increase the knowledge content of the teaching-learning methods and the type of students who graduate from higher education institutions. It can facilitate as well as hamper the processes of knowledge integration, acquisition, diffusion, relevance and preservation. The acceptance and use of IT to enhance and facilitate KM has brought to the centre stage the burning need for new policies and methodologies towards achieving quality higher education around the world (Omona, van der Weide, & Lubega, 2010).

IT fundamentally refers to the application of technology in communication to influence the teachers and learners acquisition of knowledge. It facilitate the achievement of educational goals, reinforce the advancement of essential literacy including technological literacy among teachers and students using computer-based teaching and learning methods (CBTLM) (Ifinedo, 2005; Ololube, 2009). CBTLM improves methods of teaching and learning and makes them more efficient and even more effective; it makes teaching and learning extremely interesting to both the teachers and the learners, it deepens knowledge acquisition for the teachers and learners, but has superior impact on learners. It increases the ability of learners and adds value to knowledge (Agabi et al., 2015; Ololube et al., 2013). Thus, CBTLM improves the quality of information and KM.

### 2.3. The Challenges of IT Usage and KM

The most recent Global Information Technology Report (GITR) (2015) featured the latest Networked Readiness Index (NRI). NRI assessed the indicators, policies and institutions that facilitates and enables a country to fully influence IT for improved competitiveness and

knowledge integration. The timing and release of this report is germane when many economies around the world are struggling to make sure that economic growth is equitable and provides benefits for their entire populace. As shown in the 2015 GITR report, IT act as medium for social advancement and transformation by improving access to critical services, enhanced connectivity, creating employment opportunities and knowledge societies. In the 2015 NRI ranking, Nigeria dropped seven places to rank 119th out of 143 countries surveyed. NRI for 2014 was 112th out of 148 countries surveyed, while that of 2013 was 113th out of 144 countries assessed. The low ranking is due to several factors as indicated in figure 1.

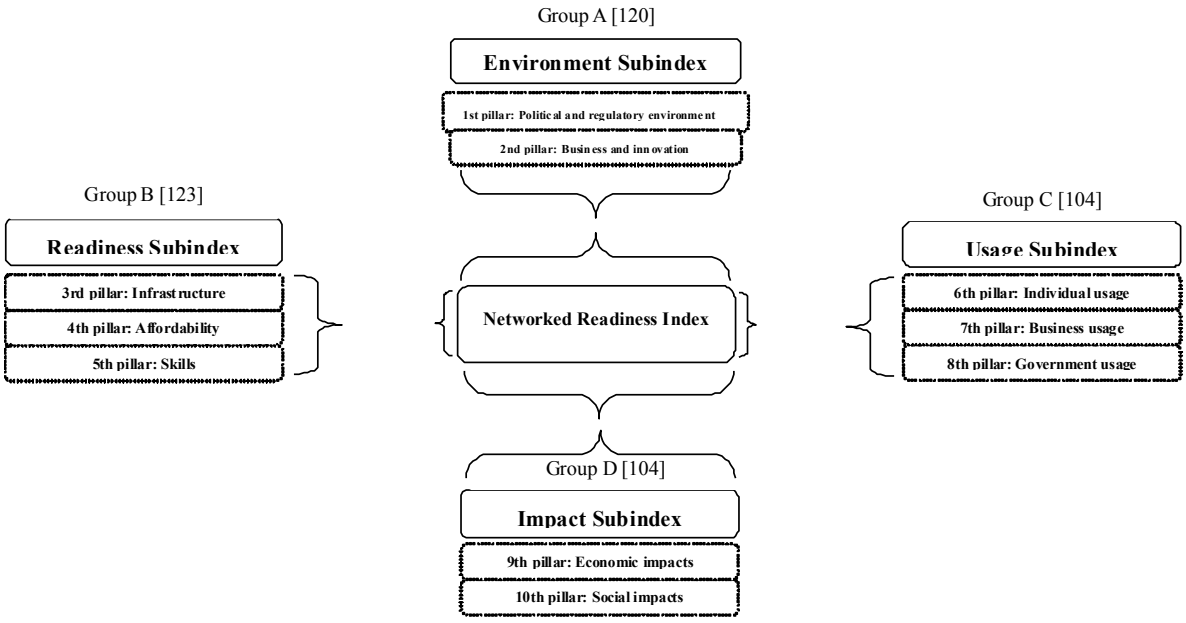



***Figure 1.*** *2015 Nigeria's Networked Readiness Index. Source: Global Information Technology Report for Nigeria (2015, p. 213)*

Presented here is a detailed analysis of the indicators that necessitated the listing of Nigeria amongst the IT low rank countries. The most important indicators to this study are the 3rd, 4th, 5th, 6th, and the 10th pillars. Indices in the 3rd pillar—infrastructure revealed that the electricity production per Kwh is very low to boost and power IT tools and services. Nigeria ranked 125th out of the 143 countries surveyed as a result of the poor electricity supply in the country. The mobile network coverage per percentage of the population showed that Nigeria ranked 116th out of the 143 countries investigated. What this depicts is that the mobile network coverage for Nigeria is low. Information on the International Internet bandwidth per kb for each user show that Nigeria ranked low, in a position of 130th out of the 143 countries evaluated. Same is true of the data for secure Internet servers/million of the population. Nigeria ranked 119th of the 143 countries examined.

The NRI index for the 4th pillar—affordability indicates that prepaid mobile cellular tariffs for PPP $/minute shows great improvement. This means that the population is willing to pay as high as one United State Dollar per minute tariff. Nigeria ranked 118th for its fixed broadband Internet tariffs for PPP $/month. The result revealed that the fixed broadband Internet tariffs for PPP $/month is low. On Internet and telephony competition, Nigeria was ranked 1st in a 0–2 (best) rating. This means that Nigeria is comparatively competing moderately fine with its

counterparts in the west because Nigeria is one of the fastest emergent telecommunications market in the world.

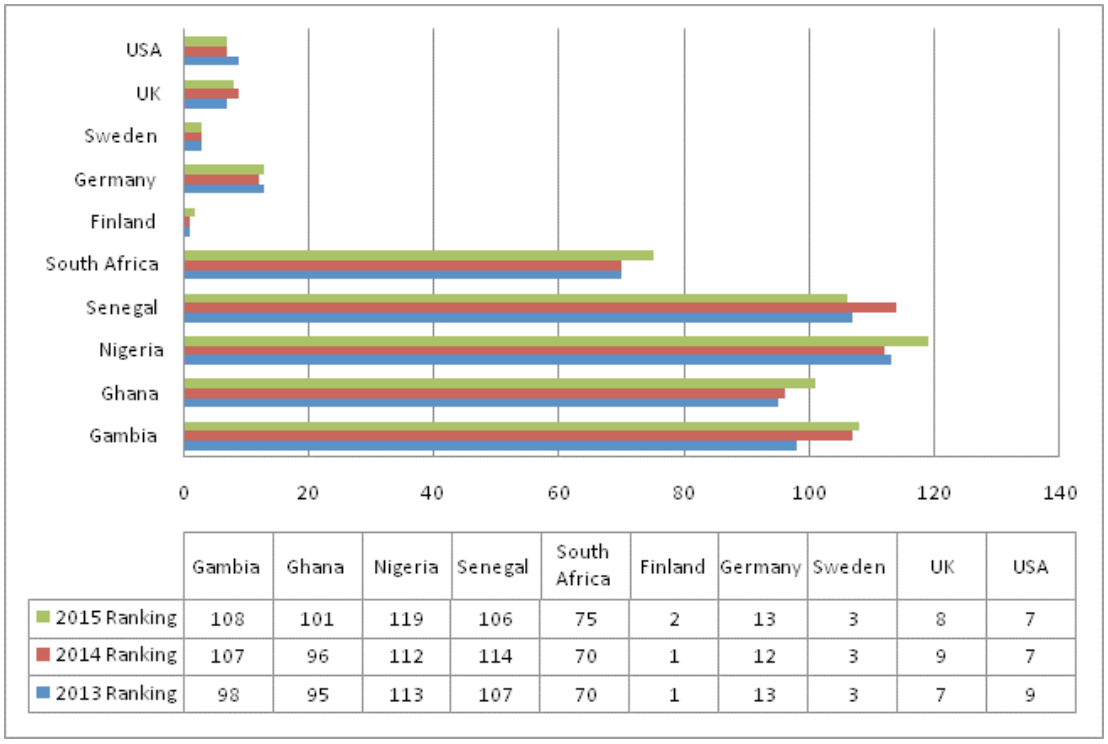
The 5th NRI indices revealed astonishing results when Nigeria ranked 121st of the 143 countries surveyed based on quality of educational system. This is in the same way true when no Nigerian university was ranked amongst the 1000 best universities in the world. Nigeria was ranked 132nd of the 143 countries examined on quality of math and science education. This result did no portray Nigeria in good light. On secondary education gross enrollment rate per percentage of the population placed Nigeria at a distant 125th position. The adult literacy rate per percentage of the population of Nigeria positioned her in 108th out of the 143 countries surveyed. This low ranking is as a result of Nigeria's poor IT penetration.

The Readiness Subindex: 3rd pillar: Infrastructure, 4th pillar: Affordability and 5th pillar: Skills, are influenced by vandalization of IT infrastructure, insecurity and inadequate electrical power supply for operations, local participation in key IT areas, inadequate skills and enabling environment **(**Okwuke, 2013).

Data for the NRI for the 6th pillar—individual IT usage revealed that mobile phone subscriptions/100 population placed Nigeria in the 87th position, slightly above half of all the 143 countries surveyed. Individuals using Internet per percent of the population depicts that Nigeria ranked 119th of the 143 countries. Information on households/personal computer revealed that Nigeria was ranked 112th. The fixed broadband Internet subscription/100 population is 140th which means Nigeria is among the last four countries that are low in fixed broadband Internet subscription. Mobile broadband subscription/100 population placed Nigeria in 98th position while on the use of virtual social networks; Nigeria was moderately placed at 82nd position.

The NRI for the 10th pillar—social impacts portray Nigeria very low in the NRI. Nigeria was ranked 123rd of the 143 countries surveyed on the impact of ICTs on access to basic service. The report rated Nigeria low on Internet access in schools at 111th position, and ICT use and government efficiency in 119th place, while the E-Participation index rated on 0–1 (best), Nigeria was rank 88th. These results are shameful considering Nigeria's position as a major player in world economy and Nigeria's ambition to position herself among the top 20 largest economies in the world by 2020 (Briggs et al., 2012).

A comparative analysis of three years NRI for selected countries in sub-Saharan Africa and the west revealed that among the sub-Saharan African countries, Nigeria was ranked 119th, Gambia 108th, Ghana 101st, Senegal 106th, and South Africa 75th. The report found that sub-Saharan African countries have low NRI, meaning that all the indicators that are required by these countries to improved IT penetration and use are not well developed compared to countries from the west that topped the list such as Germany, Finland, USA, UK, and Sweden ranked 13th, 2nd, 7th, 8th, and 3rd respectively in the 2015 NRI (See figure 2 for detail). The overall results indicated that given the existing IT penetration rate, evidence may suggest that it may take African countries and indeed Nigeria over 100 years to catch up with the west in their drive for improved KM. Figure 2 presents the 2013, 2014 and 2015 NRI and rankings for ten selected countries.




| | Gambia | Ghana | Nigeria | Senegal | South Africa | Finland | Germany | Sweden | UK | USA |
|---|---|---|---|---|---|---|---|---|---|---|
| 2015 Ranking | 108 | 101 | 119 | 106 | 75 | 2 | 13 | 3 | 8 | 7 |
| 2014 Ranking | 107 | 96 | 112 | 114 | 70 | 1 | 12 | 3 | 9 | 7 |
| 2013 Ranking | 98 | 95 | 113 | 107 | 70 | 1 | 13 | 3 | 7 | 9 |

***Figure 2.*** *Line representation of some selected countries NRI for 2013, 2014 and 2015*

### 2.4. IT Policy Impact and KM

In 2007, the Federal Executive Council of Nigeria approved a national IT policy, as well as the creation of the National Information Technology Development Agency (NITDA). NITDA was charged with the responsibility of developing and implementing IT policies (NITDA, 2015). However, voices from several quarters (e.g., Agabi et al., 2015; Okwuke, 2013; Osuagwu, 2015) are of the view that NITDA's mandate is long overdue for review due to advances in global IT use, integration and diffusion. NITDA interventions in promoting inclusive development are in policy areas like IT For Development (ICT4D), National IT Policy, National Software Policy (NSP), Local Content Guidelines, National e-Government Master Plan, States IT Policy/Strategic Plan and Open Data Development Initiative aimed to develop innovative IT policies determined to drive nationwide development. However, NITDA has failed in her IT action plan and roadmap for the nation. This is evidenced in the 2015 Global Information Technology Report for Nigeria, because ICT4D and other policies have failed to improve IT facilities, use and integration in Nigeria.

With regards to IT infrastructure, NITDA established Technology Centres (RITCs), Knowledge Access Venue (KAV), Community Access Centre (CAC), Virtual Library and Campus Wide Area Network In Tertiary Institutions (over 18 campuses benefited). NITDA Human capital responsibilities are in the areas of IT awareness, knowledge access venue (KAV), training scheme (over 10,000 graduates trained), scholarships (300 M.Sc. and 24 Ph.D's. awarded), youth empowerment scheme, ICT research and development grant (over 12 beneficiaries). In terms of institutional interventions, NITDA created State IT development agencies, establishment of Nigeria Internet Registration Association (NIRA), Establishment of National Office for Local Content (NOC), Establishment of Office for ICT Innovation and

Entrepreneurship (OIIE), and the Establishment of IT Departments in all MDAs (See figure 3). All these infinitesimal interventions put together cannot propel a nation with a population of over 170 million to attain IT sufficiency to drive KM.

In 2011, the former president of Nigeria (Dr. Goodluck Ebele Jonathan) appointed a Minister into the Ministry of Communication Technology to push the ministry ahead towards the realisation of its goals. Another move by the President after consultations with IT stakeholders was the setting up of an Adhoc Committee to harmonize the diverse policies for the different sectors in the IT landscape including education and telecommunications. The committee was charged with the responsibility of balancing and harmonizing all existing guiding principle and policies in the IT sector into a single IT policy (Agabi et al., 2015).

Notwithstanding the efforts by the Ministry of Communication Technology, the Adhoc Committee and NITDA to drive national development following multiple interventions, facts and figures show that the poor infrastructure and deficiencies of well thought policies and the low IT use and penetration in Nigeria has widened the digital gap between Nigeria and the developed countries (Okwuke, 2013). Countries with enhanced and increased access to IT and those who apply IT extensively and in an inclusive manner are able to get hold of the advantages of globalization in terms of education, politics, social, economic etc. Conversely countries with poor IT infrastructure end up not joining the race towards the globalization of its HEIs. It is certain that IT provide efficiency in global education systems, increase faculty and students' productivity and opens up novel opportunities that drives growth, development and improvement in every sector of the economy, particularly in KM (Agabi et al., 2015).

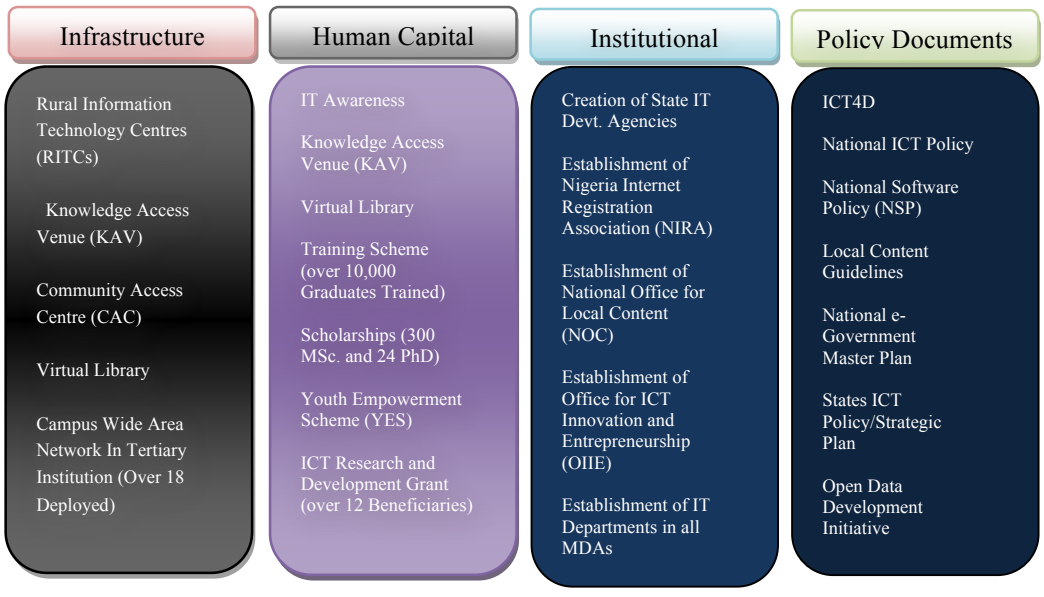



***Figure 3.*** *NITDA interventions in promoting inclusive IT development in Nigeria. Source: National Information Technology Development Agency (NITDA) (2015)*

## 3. METHODS

### 3.1. Research Design

A survey research design was used in this study. The population of the study consisted of senior faculty members that have gained tenure of over 6 years. The sampling for this study was purposive, which is characterized by the use of judgment and deliberate effort to obtain representative samples by including the most probable typical groups in the sample (Senior Lecturers, Assoc. Professors and Professors). A total of 210 questionnaires were distributed out of which a convenient sample size consisting 185 (88%) was chosen from the 192 questionnaires returned. The reason for disposing 7 questionnaires was either because they were filled out wrongly or some questions were not answered. Extracts from the 2015 Global Information Technology Report for Nigeria were used to measure levels of IT infrastructure, affordability, skills, usage, and social impacts (see figure 4) in 4 public universities in the South-South geo political zone out of over 12 universities in the region. The data for the study were collected in the third quarter of 2015.

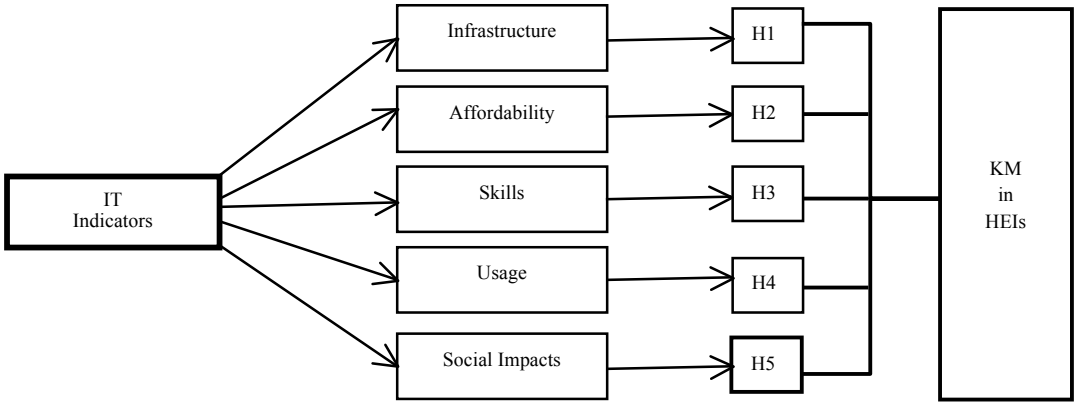



***Figure 4.*** *Research Design Summarised*

Data analysis for respondents demographic variable showed that 97(52.4%) were male, while 88(47.6%) were female. Majority of them 91(49.2%) were between 40-49 years, while 39(21.1%) were aged 50-60 years and 38(20.5%) were 30-39 years, whereas 17(9.2%) were above 60 years. Data on respondents' academic rank revealed that 72(38.9%) were Senior Lecturers, while 81(43.8%) were Associate Professors, and 32(17.3%) were Professors. The data further revealed that 63(34.1%) were lecturers in Faculty of Education, 41(22.2%) were lecturers in the Faculty of Social Sciences. 49(26.5%) were of the Arts, while 32(17.3%) were of the Sciences. See table 1 and figure 5 for detail.

***Table 1.*** *Descriptive Analysis of Respondents Demographic Variables*

| Demographic Variables | | Frequency (N) | Percentages (%) | Mean | Std. Div. |
|---|---|---|---|---|---|
| Gender | Male | 97 | 52.4 | 2.8454 | .95022 |
| | Female | 88 | 47.6 | 2.9432 | .82152 |
| Age | 30-39 years | 38 | 20.5 | 3.0263 | .75290 |
| | 40-49 years | 91 | 49.2 | 2.7912 | .98338 |
| | 50-60 years | 39 | 21.1 | 2.9487 | .75911 |
| | > 60 years | 17 | 9.2 | 3.0000 | .93541 |
| Academic Rank | Senior Lecturers | 72 | 38.9 | 2.9028 | .90631 |
| | Assoc. Professors | 81 | 43.8 | 2.8889 | .89443 |
| | Professors | 32 | 17.3 | 2.8750 | .87067 |
| Faculty | Education | 63 | 34.1 | 2.9048 | .81744 |
| | Social Sciences | 41 | 22.2 | 3.2683 | .67173 |
| | Arts | 49 | 26.5 | 2.8776 | .85714 |
| | Sciences | 32 | 17.3 | 2.4063 | 1.10306 |

### 3.2. Research Instrument

The questionnaire used in this study was structured along the 2015 Global Information Technology Report. The items were modified to fit into the purpose of this study. The questionnaire has two sections. Section 'A' pertain to respondents demographic variables (age, gender, rank, faculty and length of service), while section 'B' comprised the indicators that are of importance to this study *vis-a-vis* the 3rd pillar (Infrastructure), 4th pillar (Affordability), 5th pillar (Skills), 6th pillar (Individual Usage), and the 10th pillar (Social Impacts). The participants (faculty) responded to a four-point Likert type scale of strongly agree (4), agree (3), disagree (2), and strongly disagree (1). See table 2 for detail.

***Table 2.*** *Questionnaire used for data gathering*

| S/N | Indicators | SA | A | D | SD |
|---|---|---|---|---|---|
| | **3rd Pillar: Infrastructure** | 4 | 3 | 2 | 1 |
| 1 | Electricity production, kWh/capita impacts KM | 4 | 3 | 2 | 1 |
| 2 | Mobile network coverage, % pop. impacts KM | 4 | 3 | 2 | 1 |
| 3 | Int'l Internet bandwidth, kb/s per user impacts KM | 4 | 3 | 2 | 1 |
| 4 | Secure Internet servers/million pop. impacts KM | 4 | 3 | 2 | 1 |
| | **4th pillar: Affordability** | **SA** | **A** | **D** | **SD** |
| 5 | Prepaid mobile cellular tariffs, PPP $/min impacts KM | 4 | 3 | 2 | 1 |
| 6 | Fixed broadband Internet tariffs, PPP $/month impacts KM | 4 | 3 | 2 | 1 |
| 7 | Internet & telephony competition, 0–2 (best) impacts KM | 4 | 3 | 2 | 1 |
| | **5th Pillar: Skills** | **SA** | **A** | **D** | **SD** |
| 8 | Quality of educational system impacts KM | 4 | 3 | 2 | 1 |
| 9 | Quality of math & science education impacts KM | 4 | 3 | 2 | 1 |
| 10 | Secondary education gross enrollment rate per % impacts KM | 4 | 3 | 2 | 1 |
| 11 | Adult literacy rate per % impacts KM | 4 | 3 | 2 | 1 |
| | **6th Pillar: Individual Usage** | **SA** | **A** | **D** | **SD** |
| 12 | Mobile phone subscriptions/100 population impacts KM | 4 | 3 | 2 | 1 |
| 13 | Individuals using Internet per % impacts KM | 4 | 3 | 2 | 1 |
| 14 | Households w/personal computer impacts KM | 4 | 3 | 2 | 1 |
| 15 | Fixed broadband Internet subs/100 population impacts KM | 4 | 3 | 2 | 1 |
| 16 | Mobile broadband subs/100 population impacts KM | 4 | 3 | 2 | 1 |
| 17 | Use of virtual social networks impacts KM | 4 | 3 | 2 | 1 |
| | **10th pillar: Social Impacts** | **SA** | **A** | **D** | **SD** |
| 18 | Impact of ICTs on access to basic service impacts KM | 4 | 3 | 2 | 1 |
| 19 | Internet access in schools impacts KM | 4 | 3 | 2 | 1 |
| 20 | ICT use & government efficiency impacts KM | 4 | 3 | 2 | 1 |
| 21 | E-Participation Index, 0–1 (best) impacts KM | 4 | 3 | 2 | 1 |

*Knowledge Management

### 3.3. Data Analysis Techniques

The respondents' answers were keyed into SPSS version 21.0 software programme and they were analyzed using Simple Percentage, Mean Score and Chi-square statistical tools. Chi-square analysis was used because it is a statistical process that aids the estimation of the relationships among variables. Chi-square is used in this study because the focus is on the relationship between dependent variable and independent variables to determine if the hypotheses are true or false. The statistical significant was set at $p < 0.05$ to measure if the observed researcher's confidence level in the sample also exists in the population.

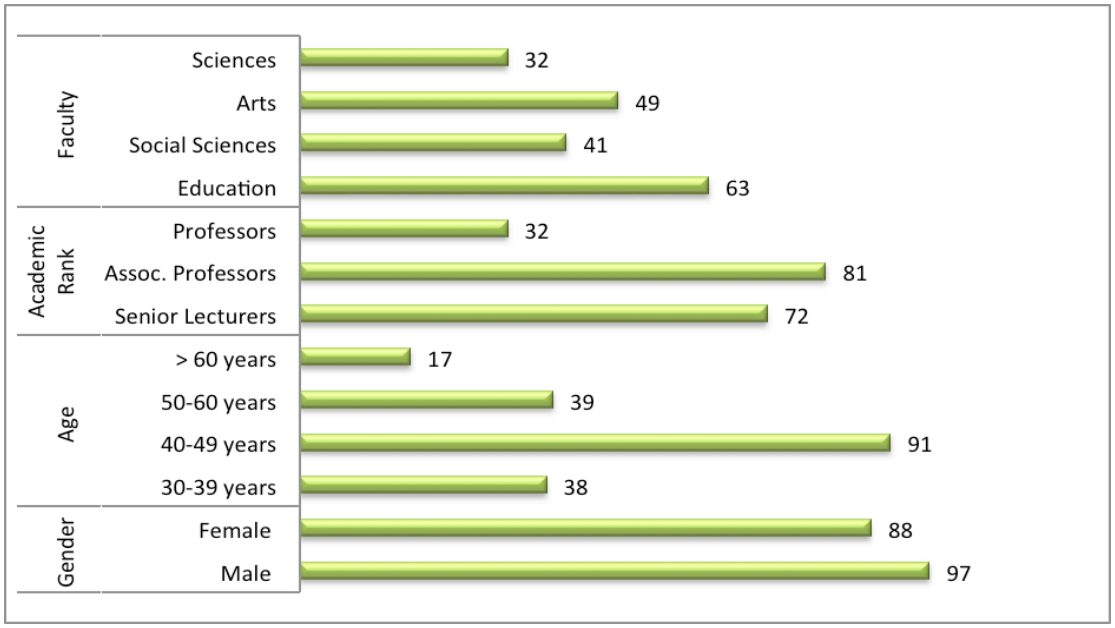



***Figure 5.*** *Bar Chart Representation of Respondents Demographic Variables*

### 3.4. Validity and Reliability

Faculty members who are experienced in the construction of research instruments helped in the validation of the questionnaire as adapted and modified. A pilot test was conducted prior to when the main questionnaires were distributed to determine how respondents understood the questions. To test the consistency with which the research instrument measures what it is supposed to measure, SPSS version 21.0 of a computer programme was also employed, and an overall Cronbach Alpha reliability estimate of .783 was obtained for the 21 items in section 'B' of the questionnaire. Thus, the instrument was considered to be reliable.

## 4. RESULTS/DISCUSSION

### 4.1. Hypothesis One: IT infrastructure / KM in HEIs

Chi-square analysis (table 3) performed revealed that IT infrastructure is significantly related to KM in HEIs. Respondents were of the view that the level of electricity production per kWh/capita impacts KM ($X^2$ = *118.676; p. > .000*). They were also of the opinion that the mobile network coverage per percentage of the population impacts KM ($X^2$ = *39.886; p. > .000*). Same is true when the respondents' strongly observed that the international Internet bandwidth per kb/s for users impacts KM ($X^2$ = *140.514; p. > .000*), and the same opinion holds that secure Internet servers per million of the population impacts KM ($X^2$ = *81.400; p. > .000*). With a cumulative $X^2$ = 95.119*; p. > .000, tested at .05* level of significance, hypothesis one was rejected. The overall perception is that the 2015 Global Information Technology Report for Nigeria on weak IT infrastructure is significantly related to KM in Nigerian HEIs.

The data obtained revealed that the absence of basic IT infrastructure is of great importance to the development of KM in HEIs in Nigeria. Successful KM in HEIs in Nigeria cannot be guaranteed without the use of IT infrastructures like constant electricity supply to power computer and related gadgets, Internet connectivity and servers, network coverage, television, etc. (Ololube, 2006). Most villages, towns and cities in Nigeria are yet to have electricity or have fluctuations in its supply. Electricity services for those who have access are in most cases epileptic (Yusuf, 2006). The poor state of mobile telephone network has increased dial-up cost for most Nigerians. Network coverage is still limited, and services are still far from being perfect (Ololube & Ubogu, 2009).

***Table 3.*** *Chi-square analysis of IT infrastructure/KM in HEIs*

| | **3rd Pillar: Infrastructure** | **Mean** | **SD** | **Chi-square** | **Sig.** |
|---|---|---|---|---|---|
| 1 | Electricity production, kWh/capita impacts KM | 2.8919 | .89028 | 118.676 | .000 |
| 2 | Mobile network coverage, % population impacts KM | 3.3784 | .75005 | 39.886 | .000 |
| 3 | Int'l Internet bandwidth, kb/s per user impacts KM | 2.8108 | .89193 | 140.514 | .000 |
| 4 | Secure Internet servers/million population impacts KM | 3.3838 | .65835 | 81.400 | .000 |
| Total | | 3.1162 | .79765 | 95.119 | .000 |

*Knowledge Management

### 4.2. Hypothesis Two: IT affordability / KM in HEIs

Taken as a whole, data in table 4 revealed significant relationships between IT affordability and KM in HEIs *($X^2$ = 41.112; p. > .000, tested at .05* level of significance*)*. The respondents were of the view that prepaid mobile cellular tariffs per min impacts KM *($X^2$ = 30.157; p. > .000)*, fixed broadband Internet tariffs per month impacts KM ($X^2$ = *56.795; p. > .000*), and Internet and telephony competition impacts KM *($X^2$ = 36.384; p. > .000)*. As a result, hypothesis two

was rejected, because there is a significant relationship between prepaid mobile cellular tariffs per min, fixed broadband Internet tariffs per month and Internet and telephony competition, which makes it difficult for students to access IT facilities frequently.

The widening gap between the poor and the rich is so conspicuous that economic situations and their effects on majority of Nigerian students stands as the foremost barrier in the affordability of IT tools and services (Ololube, 2006). Over 82% of Nigerian students live below poverty line. An average middle-income earner cannot afford basic IT and communication appliances. Hence, computer and IT related telecommunication services might not be functional in most Nigerian students homes, they see IT tools and services as luxury. The fee paid for IT related gadgets and services in Nigeria is almost twice the monthly take-home pay of an average parent. Thus students from these type of homes find it extremely difficult to think of and owning IT appliances to support their academic activities. Similarly, most lecturers in Nigerian HEIs cannot afford the services of IT professionals. In most cases the majority of lecturers are not capable of owning a computer that has 24 hours, 7 days a week Internet connection because of the high cost associated to such gadgets and services.

***Table 4.*** *Chi-square analysis of IT affordability/KM in HEIs*

| | **4th pillar: Affordability** | **Mean** | **SD** | **Chi-square** | **Sig.** |
|---|---|---|---|---|---|
| 5 | Prepaid mobile cellular tariffs, PPP $/min impacts KM | 2.7838 | 1.01444 | 30.157 | .000 |
| 6 | Fixed broadband Internet tariffs, PPP $/month impacts KM | 2.9676 | 1.10288 | 56.795 | .000 |
| 7 | Internet & telephony competition, 0–2 (best) impacts KM | 2.7892 | .95205 | 36.384 | .000 |
| Total | | 2.8468 | 1.02312 | 41.112 | .000 |

*Knowledge Management

### 4.3. Hypothesis Three: IT skills / KM in HEIs

Data in table 5 revealed significant relationship between IT skills and KM in HEIs. The information (items 8-11) that tested hypothesis three depicts that the respondents agree that IT skills impacts KM in HEIs ($X^2$ = *151.702; p. > .000, tested at .05* level of significance). The respondents hold that the quality of educational system impacts KM *($X^2$ = 143.930; p. > .000)*. They were of the view that the quality of math and science education impacts KM *($X^2$ = 176.578; p. > .000),* secondary education gross enrollment rate per percentage of the population impacts KM *($X^2$ = 154.351; p. > .000),* and adult literacy rate per percentage of the population impacts KM *($X^2$ = 131.951; p. > .000)*. As a result, hypothesis three was rejected.

The imbalance in Nigerian educational systems have become increasingly expensive to handle and have damaged the teaching and learning ability of many teachers and students (Aduwa-Ogiegbaen & Iyamu, 2005; Bolu & Egbo, 2014). Up till now, Nigeria's policy making and programmes remains uneven and gradual. The path to quality educational system, and the requirement for the actualization of quality education are far away because of the huge inadequate infrastructure and IT assisted teaching and learning devices (Ololube et al., 2013). Incompetence among graduates and lecturers account for the reasons why an effective knowledge society will hardly be achieved in Nigeria.

It is generally believed that the roles, behaviour patterns, culture and interests of males and females students dominate the gross enrollment amongst students, and most of these students dread the use of IT. A study (Ololube, 2009) found that computer communication and IT attitude and anxiety among higher education students exposed to view that most Nigerian students have phobia for IT appliances.

***Table 5.*** *Chi-square analysis of IT skills/KM in HEIs*

| | **5th Pillar: Skills** | **Mean** | **SD** | **Chi-square** | **Sig.** |
|---|---|---|---|---|---|
| 8 | Quality of educational system impacts KM | 3.3892 | .65100 | 143.930 | .000 |
| 9 | Quality of math & science education impacts KM | 3.5351 | .61689 | 176.578 | .000 |
| 10 | Secondary education gross enrollment rate per % impacts KM | 3.3459 | .67510 | 154.351 | .000 |
| 11 | Adult literacy rate per % impacts KM | 3.4216 | .71137 | 131.951 | .000 |
| Total | | 3.4229 | .66359 | 151.702 | .000 |

*Knowledge Management

### 4.4. Hypothesis Four: IT Usage / KM in HEIs

The Chi-square analysis in table 6 showed that IT usage is significantly related to KM in HEIs. Respondents were of the view that the level of IT usage impacts KM ($X^2$ = *123.713; p. > .000; tested at .05* level of significance). They were of the opinion that the mobile phone subscriptions per percentage of the population impacts KM ($X^2$ = *134.805; p. > .000*). Likewise the respondents' strongly observed that the individuals using Internet per percentage impacts KM ($X^2$ = *183.670; p. > .000*), and they opinioned that households w/personal computer of the population impacts KM ($X^2$ = *162.395; p. > .000*). Fixed broadband Internet subscription per 100 of the population impacts KM *($X^2$ = 53.724; p. > .000)*. The same opinion holds that the mobile broadband subscription per 100 of the population impacts KM ($X^2$ = *136.292; p. > .000*). Similarly, the respondents hold that the use of virtual social networks impacts KM *($X^2$ = 71.395; p. > .000)*. Thus, hypothesis four was rejected. The overall perception is that the 2015 Global Information Technology Report for Nigeria on IT usage is significantly related to KM in Nigerian HEIs.

The integration of ITs in higher education teaching and learning has transformed educational systems globally, and they are under greater demands to use IT appliances to teach students the knowledge and skills they need in the 21st century (Larose et al., 1999).

However, IT usage in traditional and face to face (f2f) methods has impacted the quality of teaching and learning. In concrete terms, IT has enhanced teaching and learning through its active, interactive, and appealing content, and has provided genuine opportunities for individualized instruction (Yusuf, 2005). According to a study by Ariyo & Olaojoyetan (2013), the present state of the fixed broadband Internet subscription per 100 of the population is inadequate. The study further highlights that in some African countries, regional connectivity is missing, but agreed that when broadband is readily available, behaviour patterns in Nigeria will change because we will rely on such to obtain services and get tasks required in our daily existence as faculty and students. To Grützmann, Macedo and Zambalde (2013), social networks is made up of actors with different degrees of innovativeness that allow actors to

collect new ideas and measure their acceptance, they concluded that the evidences are that there are relationships between social networking and KM.

Regrettably, Nigeria as a nation, came late into the digital circle (DC). This is as a result of the limitations brought about by economic, political, social and government policies. Basically, the slow admittance to basic IT equipment, slow internet network and connectivity and the shortage of personal computers has made KM in HEIs in Nigeria unrealistic (Ololube, 2009).

***Table 6.*** *Chi-square analysis of Individual IT usage/KM in HEIs*

| | **6th Pillar: Individual Usage** | **Mean** | **SD.** | **Chi-square** | **Sig.** |
|---|---|---|---|---|---|
| 12 | Mobile phone subscriptions/100 population impacts KM | 3.4324 | .71249 | 134.805 | .000 |
| 13 | Individuals using Internet per % impacts KM | 3.3135 | .58892 | 183.670 | .000 |
| 14 | Households w/personal computer impacts KM | 3.2649 | .62564 | 162.395 | .000 |
| 15 | Fixed broadband Internet subs/100 population impacts KM | 3.0378 | .87457 | 53.724 | .000 |
| 16 | Mobile broadband subs/100 pop. impacts KM | 3.1405 | .50188 | 136.292 | .000 |
| 17 | Use of virtual social networks impacts KM | 3.3676 | .57580 | 71.395 | .000 |
| Total | | 3.2594 | .64655 | 123.713 | .000 |

*Knowledge Management

### 4.5. Hypothesis Five: IT Social Impacts / KM in HEIs

The data for hypothesis five (table 7) revealed significant relationships between IT social impacts and KM in HEIs *($X^2$ = 127.429; p. > .000, tested at .05* level of significance*)*. The respondents were of the observation that impact of ICTs on access to basic service impacts KM *($X^2$ = 138.438; p. > .000)*. Almost all the respondents were of the opinion that Internet access in schools impacts KM (*$X^2$ = 203.557; p. > .000*). They said ICT use and government inefficiency impacts KM *($X^2$ = 57.346; p. > .000)*, while E-Participation Index they say impacts KM *($X^2$ = 110.378; p. > .000)*.

HEIs are dedicated to excellence in research, teaching and learning. Excellence can be taken to mean effectively providing teaching and learning experiences that prepare faculty and students for the challenges of the today's complex, ever changing, and diverse workplace through effective KM (Ololube, 2009). Studies (e.g., Anne, Seppo & Shoji, 2010; Waycott et al., 2010; Bennett & Maton, 2010; Feeney, 2010; Margaryan, Littlejohn & Vojt, 2011; Nwokeocha, 2011; Kpolovie et al., 2014) of inequality in access to and use of IT among students and faculty (lecturers) has over the years attracted significant attention by researchers, educational managers, policy makers and the international community at large. And never in the history of human existence have there been a large number of people with access to computers, Internet networks, and electronic technologies (Margaryan et al., 2011; Waycott et al., 2010). However, the few persons that have access to basic IT gadgets and services in Nigeria are the very rich ones (Ololube et al., 2013). The Internet access in schools that will assist KM is very

limited. IT is essential to proper knowledge use and application in KM (Nweze, 2010). To keep pace with global developments, it is of essence that faculty, students, educational institutions and the Nigerian society at large adopt and become skilful and proficient in the use of IT because IT stands to extensively change the speed and profundity of IT available and the distribution of knowledge in what is increasingly referred to as KM (Ololube et al., 2013).

***Table 7.*** *Chi-square analysis of Social impacts/KM in HEIs*

| | **10th pillar: Social Impacts** | **Mean** | **SD** | **Chi-square** | **Sig.** |
|---|---|---|---|---|---|
| 18 | Impact of ICTs on access to basic service impacts KM | 3.2703 | .70127 | 138.438 | .000 |
| 19 | Internet access in schools impacts KM | 3.1351 | .40123 | 203.557 | .000 |
| 20 | ICT use & government efficiency impacts KM | 1.2216 | .41646 | 57.346 | .000 |
| 21 | E-Participation Index, 0–1 (best) impacts KM | 2.7027 | 1.19475 | 110.378 | .000 |
| Total | | 2.5824 | .67842 | 127.429 | .000 |

*Knowledge Management

## 5. CONCLUSION/RECOMMENDATIONS

In this paper, we evaluated the 2015 Global Information Technology Report and its consequences on KM in HEIs in Nigeria. The study brought to the front burner that IT enhances KM in higher education. The several outstanding issues that will bridge the current existing gaps between the requirements and the challenges facing the acceptance and use of IT to enhance KM in higher education was addressed.

This study focused on the perceived IT infrastructure, affordability, skills, individual use, and social impacts in HEIs in Nigeria. It held that IT constitutes a central force in an effort to build a Knowledge society supported by IT. HEIs are permanent entities charged with the responsibility to create and diffuse knowledge for national development. All human societies depend on these institutions for its growth and for the production of new knowledge, its transmission through education and training, and its dissemination through information communication technologies (Nwokeocha, 2011; Ololube et al., 2013).

This timely study realised that in spite of the unequalled mobile phone saturation, which scarcely have Internet connections, Nigeria is far from being near the digital age if credible and trustworthy policy measures are not immediately put in place, because IT services and products are changing by the day (Osuagwu, 2015).

The findings of this study are concerned with IT and KM in higher education in Nigeria. The findings suggest that Nigeria need to develop a more proactive understanding of the role IT play in the lives of both faculty and students. According to Bennett and Maton (2010), nations must in fact move beyond simply paying lip services and focus their attention on more effective analysis of the experiences offered by IT for effective KM. For Nigeria and other developing countries, the promotion of faculty and students through IT literacy programmes is fundamental to actualising the significance of KM in higher education for economic and educational development.

According to the Global Information Technology Report (2015) on NRI, only a third of the world population enjoys access to the Internet in spite of the fact that more than half of the population now own a mobile phone. Africa is ranked as one of the highest in mobile phone penetration but the report found that the lack of access to Internet is depriving many African HEIs the opportunity to take full advantage of blended learning and web-based learning and services to enhance KM for development to strive.

Nigerian HEIs can make substantial strides in connecting more of their faculty and students to the Internet to bring about positive KM. Not until Nigeria put together enabling policies, regulations and laws that will advance and improve access to IT infrastructure, Internet and computer affordability, skilled personnel, individual use and its social impacts, Nigeria's progress will stagnate.

## REFERENCES

Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. (2005). Using Information and Communication Technology in Secondary Schools in Nigeria: Problems and Prospects. *Educational Technology &Society, 8*(1), 104-112.

Agabi, C. O., Agbor, C. N., & Ololube, N. P. (2015). ICT Policy Outcomes for National Development: The Place of Knowledge management in Nigerian Higher Education. *American Journal of Networks and Communications, 4*(5), 104-111. DOI: 10.11648/j.ajnc.20150405.11.

Agbeja, O., & Fajemisin, D. O. (2008). Knowledge Management: Strategy For Corporate Survival And Sustainable Global Development. *Journal of Knowledge Management Practice, 9*(2). Retrieved August 28, 2015 from http://www.tlainc.com/articl157.htm.

Akuegwu, B. A., Anijaobi-Idem, F. N., & Ekanem, E. E. (2011). Higher Institution Students' Access to Information and Communications Technology in Nigeria: Management Imperatives for Labour Market Preparations. *European Journal of Business and Management, 3*(11), 29-40.

Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2009). Trends in Global Higher Education: Tracking an Academic Revolution. Victoria: UNESCO World Conference on Higher Education.

Anne, N., Seppo, T. & Shoji, N. (2010). University teachers' approaches to teaching and their pedagogical use of ICTs: A comparative case study of Finland, Japan and India. *US-China Education Review, 7*(7), 1-14.

Ariyo, A. O., & Olaojoyetan, M. C. (2013). The Poor State of Broadband in Nigeria: An Impediment to National Development and Globalisation. *Academic Journal of Interdisciplinary Studies, 2*(2), 51-60. Doi:10.5901/ajis.2013.v2n12p51.

Baskerville, R., & Dulipovici, A. (2006). The theoretical foundations of knowledge management. *Knowledge Management Research & Practice, 4*, 83–105.

Bellinger, G., Castro, D., & Mills, A. (2004) Data, Information, Knowledge and Wisdom. Retrieved July 30, 2015 from http://www.systems–thinking.org/dikw/dikw.htm.

Bennett, S., & Maton, K. (2010). Original article: Beyond the "digital natives" debate: Towards a more nuanced understanding of students' technology experiences. *Journal of Computer Assisted Learning*, *26*(5), 321-331.

Bolu, C. A., & Egbo, K. (2014). The Role of Higher Education Institutions in the Development of ICT Professionals for Innovation in Nigeria. *International Journal of Engineering Innovation & Research, 3*(1), 1-7.

Briggs, T., Ololube, N. P., Kpolovie, P. J., Amaele, S., & Amanchukwu, R. N. (2012e). Evaluating the quality of public early childhood education and vision 20: 2020: the role of government. *African Journal of Economic and Sustainable Development*, *1*(3), 243–264. DOI: 10.1504/AJESD.2012.049289.

Cárdenas, I., Al-Jibouri, S. H. S., Halman, J. I. M., & van Tol, F. A. (2013) Capturing and integrating knowledge for managing risks in tunnel works. *Risk Analysis, 33*(1), 92–108.

Chong, S. C., & Choi, Y. S. (2005). Critical Factors In The Successful Implementation Of Knowledge Management. *Journal of Knowledge Management Practice*. Retrieved March 10, 2016 from http://www.tlainc.com/articl90.htm.

Dakwa, K. D. (2010). *Information and Communication Technology in Nigeria: Prospects and Challenges for Development* (review). *Africa Today, 56*(4), 95-96.

Federal Republic of Nigeria (FRN) (2013). National Policy on Education 6th edition. Lagos: NERC Press.

Global Information Technology Report (2015). Networked Readiness Index. Retrieved August 30, 2015 from http://reports.weforum.org/global-information-technology-report-2015/downloads/.

Goddard, J. (2005). Institutional Management and Engagement with the Knowledge Society. *Higher Education Management and Policy, 17*(1), 23-34. DOI: http://dx.doi.org/10.1787/hemp-v17-art2-en.

Grützmann, A., Macedo, F. M. F., & Zambalde, A. L. (2013). Knowledge Management and Innovation: The Role of Virtual Social Networks in Innovative Consumer Behavior. Journal of Technology Management & Innovation, 8, 209-220.

Gupta, S., & Bostrom, R. (2009). Technology mediated learning: A comprehensive theoretical model. Journal of the *Association for Information Systems, 10*(9), 686-714.

Ifinedo, P. (2005). Measuring Africa's e-readiness in the global networked economy: A nine country data analysis. *International Journal of Education and Development using Information and Communication Technology, 1*(1), 53-71.

Ifinedo, P. (2006). Acceptance and Continuance Intention of Web-Based Learning Technologies (WLT) among University Students in a Baltic Country. *The Journal of Information Systems in Developing Countries, 23*(6), 1-20.

Ifinedo, P., & Ololube, N. P. (2007). A Discourse on the Problems, Prospects, and Progress of Distance Education in a Developing Country. In E. P. Bailey (Ed.) *Focus on Distance Education Developments* (pp. 183-194). New York, NY: Nova Science Publishers.

Kpolovie, P. J., Iderima, C. E., & Ololube, N. P. (2014). Computer literacy and candidate performance on computer-based tests. In N. P. Ololube (Ed). *Advancing technology and educational development through blended learning in emerging economies,* (pp. 80-106). Hershey, PA: Information Science Reference. DOI: 10.4018/978-1-4666-4574-5.ch005.

Larose, F., David, R., Dirand, J., Karsenti, T., Vincent Grenon, V., Lafrance, S., & Cantin, J. (1999). Information and Communication Technologies in University Teaching and in Teacher Education: Journey in a Major Québec University's Reality. *Electronic Journal of Sociology. Retrieved October 26, 2015 from* http://www.sociology.org/content/vol004.003/francois.html.

Lopez, V. (2003). An exploration of the use of information technologies in the college classroom. *College Quarterly*, *6*(1). Retrieved August 15, 2015 from http://www.collegequarterly.ca/2003-volo6-num01-fall/lopes.html.

Lu, C., & Cheng, S. (2012). Applying Computer-based Technology to Instruction for the Effectiveness of Teaching and Learning. *ARPN Journal of Science and Technology, 2*(10), 1013-1017.

Mac-Ikemenjima, D. (2005). e-Education in Nigeria: Challenges and Prospects. Paper Presented at the 8th UN ICT Task Force Meeting April 13-15, 2005 Dublin, Ireland.

Magnier-Watanabe, R., Benton, C., & Senoo, D. (2011). A study of knowledge management enablers across countries. *Knowledge Management Research & Practice,* 9**,** 17–28. doi:10.1057/kmrp.2011.1.

Margaryan, A., Littlejohn, A., & Vojt, G. (2011). Are digital natives a myth or reality? University students' use of digital technologies. *Computers & Education*, *56*(2), 429-440.

NITDA (2015). NITDA Interventions in promoting Inclusive Development. Retieved September 12, 2015 from http://www.ncs.org.ng/wp-content/uploads/2015/08/NITDA-Presentation.pdf.

Nwafor, S. O. (2005). Information Technology: A modern tool for the administration of universities in Rivers State. *Nigerian Journal of Educational Administration and Planning, 5*(2), 184-188.

Nwokeocha, S. (2011). The Digital Divide between Students and Lecturers: A Case study of Access and Attitudes towards Information Communication Technology (ICT) in Selected Nigerian Universities. Retrieved September 21, 2015 from http://www.iiis.org/CDs2010/CD2010IMC/ICSIT_2010/PapersPdf/HB369QL.pdf

Okwuke, E. (2013). New ICT policy as catalyst for national development. Retrieved August 2, 2015 from http://dailyindependentnig.com/2013/04/new-ict-policy-as-catalyst-for-national-development/.

Oladejo, B. O., & Osofisan, A. O. (2011). A Conceptual Framework for Knowledge Integration in the Context of Decision Making Progress. *African Journal of Computer & ICT, 4*(2), 25-32.

Ololube, N. P. (2006). Appraising the relationship between ICT usage and integration and the standard of teacher education programs in a developing economy, *International Journal of Education and Development Using*, *2*(3), 70-85.

Ololube, N. P. (2009) Computer communication and ICT attitude and anxiety among higher education students. In A. Cartelli & M. Palma (Eds). *Encyclopedia of Information and Communication Technology*, (pp. 100-105). Hershey, PA: Information Science Reference DOI: 10.4018/978-1-59904-845-1.ch014.

Ololube, N. P. (2012). *Sociology of education and society: an interactive approach*. Owerri: SpringField Publishers.

Ololube, N. P. (2015). Active Learning Application of Technology Tools and Services to Increase Student Achievement in Online and Blended Learning Environments in Higher Education Institutions. In N. P. Ololube, P. J. Kpolovie, & L. N. Makewa (Eds.), *Handbook of Research on Enhancing Teacher Education with Advanced Instructional Technologies* (pp. 109-129). DOI: 10.4018/978-1-4666-8162-0.ch006.

Ololube, N. P., & Ubogu, A. E. (2009). ICTs and distance education: the Nigerian experience. In A. Cartelli & M. Palma (Eds.), *Encyclopedia of information and communication technology,* **(**pp. 396-400). Hershey, PA: Information Science Reference. DOI: 10.4018/978-1-59904-845-1.ch053.

Ololube, N. P., Kpolovie, P. J., Amaele, S., Amanchukwu, R. N., & Briggs, T. (2013). Digital Natives and Digital Immigrants: A study of Information Technology and Information Systems (IT/IS) Usage between Students and Faculty of Nigerian Universities. *International Journal of Information and Communication Technology Education, 9*(3), 42-64. DOI: 10.4018/jicte.2013070104.

Ololube, N. P., Ubogu, A. E., & Egbezor, D. E. (2007). ICT and Distance Education Programs in a Sub-Saharan African Country: A Theoretical Perspective. *Journal of Information Technology Impact, 7*(3), 181-194.

Omona, W., van der Weide, T., & Lubega, J. (2010). Using ICT to Enhance Knowledge Management in Higher Education: A Conceptual Framework and Research Agenda. *International Journal of Education and Development using Information and Communication Technology,* 6(4), 83-101.

Osuagwu, P. (2015). Nigeria drops in Networked Readiness ranking. Retrieved August 31, 2015 from http://www.vanguardngr.com/2015/06/nigeria-drops-in-networked-readiness-ranking/.

Oyovwe-Tinuoye, G., & Adogbeji, B. O. (2013). Information Communication Technologies (ICT) as an Enhancing Tool in Quality Education for Transformation of Individual and the Nation. *International Journal of Academic Research in Business and Social Sciences, 3*(4), 21-32.

Phelps, R. (2002). Capability versus competency in information technology education: challenging the learning context for lifelong technological literacy. In B. Cope & M. Kalantzis (Eds.), *Learning for the future: proceedings of the Learning Conference 2001 (Eighth International Literacy & Education Research Network Conference on Learning)*, Spetses, Greece, 4-8 July 2001. Altona: Common Ground Publishing.

Sridharan, B., Tretiakov, A., & Kinshuk, S. (2004), Application of Ontology to Knowledge Management in Web based Learning. In L. Kinshuk, C. K. Sutinen, E. Sampson, D. Aedo, L. Uden, and E. Kahkonen (Eds.), Proceedings of the 4th IEEE International Conference on Advanced Learning Technologies (pp. 663–665), August 30–Sept 1, 2004, Joensuu, Finland. Los Alamitos, CA: IEEE Computer Society.

The Economist Intelligence Unit (2008). The future of higher education: How technology will shape learning. Retrieved September 24, 2015 from http://www.nmc.org/pdf/Future-of-Higher-Ed-(NMC).pdf.

Tremblay, K., Lalancette, D., & Roseveare, D. (2012). Assessment of Higher Education Learning Outcomes, Feasibility Study Report Volume 1 – Design and Implementation. Paris: OECD.

Waycott, J., Bennett, S., Kennedy, G., Dalgarno, B., & Gray, K. (2010). Digital divides? Student and staff perceptions of information and communication technologies. *Computers & Education*, *54*(4), 1202-1211.

Yusuf, M. A., Afolabi, F. O., & Loto, A. B. (2013). Appraising the role of information communication technology (ICT) as a change agent for higher education in Nigeria. *International Journal of Educational Administration and Policy Studies, 5*(8), 177-183. DOI: 10.5897/IJEAPS12.027.

Yusuf, M. O. (2005). Information and Communication Technology and Education: Analysing the Nigerian National Policy for Information Technology. *International Education Journal, 6*(3), pp. 316-321.

Zeng, L., & Yunkuo, M. A. (2014). Tacit Knowledge Based on the Cultivation of Innovative Ability for Graduate Students. *Higher Education of Social Science*, 6(2), 59-63. DOI: http://dx.doi.org/10.3968/j.hess.