

# Assessment of the Utilization of Information and Communication Technology-Based Library Resources in Postgraduate Research in Universities in Nigeria

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## ABSTRACT

This study was conducted to assess the Information and Communication Technology (ICT)-based library resources in Nigerian universities. This is with the aim of finding out the extent of the use of ICT-based library resources for postgraduate research in Nigerian Universities (federal, state and private). A total number of five hundred and ten (510) respondents were used for the study. The instruments for data collection were questionnaire and observation checklist. Five hundred and ten copies of the questionnaire were distributed to the postgraduate researchers at the three universities in the South East Nigeria and three hundred and sixty-six (366) were returned representing 72% return rate. The following statistical measures were employed for the data analysis: frequency table, mean (X) and Standard deviation (SD). The findings revealed that there was a significant difference in the mean ratings of postgraduate students in Federal, State and Private universities on the utilization of ICT-based library resources for research. Nevertheless, the researcher observed that faculty of Education postgraduate researchers were the predominant users of ICT-based library resources.

**Key words:** Research, ICT, Library, Engineering, Education, Social Sciences, University and Nigeria.

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## INTRODUCTION

Information and Communication Technology (ICT) denotes a convergence of interests between electronics computing and telecommunications. Osuagwu (1999) explained that ICT refers to the convergence of microelectronics, telecommunications and computers. Also, Lucey (1997) explained that ICT refers to the process of acquisition, processing, storage and dissemination of vocal, pictorial, textual and numeric information. Edafiogho et al. (2006) listed the components of ICT to include computer systems, communication systems and reprographic systems. ICT

as a generic term refers to the technologies used in collecting, storing, processing and passing information on various forms. This implies that ICT includes communication satellites, radio, television, telephone, video, tape recorder and microphone, among others. ICT, according to Patterson (2005), conveys the notion of the application or handling of technologies that allow various forms of information to be processed, transmitted, manipulated, stored and retrieved with speed, accuracy and efficiency. The ease of data processing and transmission, provided by these technologies has

enhanced the flow of information across borders. ICT is giving birth to new concepts, new products, and novel ideas. It transforms not only industries and business, but also other aspects of life activities such as educational research. In this study, the extent of utilization of ICT-based library resources for postgraduate's research in Nigerian universities will be assessed. For the purpose of the study, the term ICT-based library resources shall connote all Information and Communication Technology-related electronic resources.

## **STATUS OF RESEARCH IN NIGERIAN UNIVERSITIES**

Researches in the various disciplines of scientific disciplines (Engineering, Agriculture and Physical Sciences), education, and social sciences have strategic for the economic growth of many countries. Still, it is disturbing to note that Nigerian universities are lowly rated in terms of research within Africa and the world over. This fact is evident in various authentic world rankings of universities. In an assessment by web metrics University Web Ranking, which released 2015 ranking of top 100 universities in Africa, no Nigerian university made even the top 10 despite having about 148 universities and close to 106 polytechnics and colleges of education spread all over the country. The fact that Universities from South Africa, Egypt, Morocco and Kenya were all ahead of all Nigerian universities is a poignant testimony that our educational status has really dipped. It is worse when Nigerian universities are assessed with their counterparts in developed countries, because no single African university even appeared within the top 100 universities in the world. No Nigerian university even appears within the top 500 (Buhari, 2015). One then begins to wonder where the problem lies, if the university libraries in Nigeria are no longer functioning to provide the needed support for graduate students to improve their research, or if ICT facilities are not sufficiently used to further research activities as is the case in other countries. It is against this backdrop that this study examines the extent of usage of ICT-based library resources (electronic resources computer facilities, telecommunication technology, and other electronic devices) for postgraduate research in Nigerian federal, state and private universities. It specifically examines the types of ICT facilities used and the extent of utilization.

## **STATEMENT OF THE PROBLEM**

Due to Nigerian universities are lowly rated in terms of research within Africa and the world over, the government of Nigeria has been making enormous progress in fast-tracking postgraduate studies and research in the universities. Funding has been provided in the acquisition of electronic resources and setting up

the necessary networked infrastructure. Negotiation with publishers by the librarians has resulted in scholarly electronic publications being made available free or at heavily discounted prices through programmes such as online public access catalog (OPAC), Journal Storage (JSTOR), Access to Global Online Research on Agriculture (AGORA), Health Internetwork Access to Research Initiative (HINARI), and Programme for the Enhancement of Research Information (PERI) (Ogbomo, 2013). With the development of reliable scholarly electronic communication facilities in Nigerian universities, postgraduates conducting research will be stimulated to use the facilities to advance knowledge creation, communication, utilization, and dissemination and by so doing improve Nigeria's and Africa's contribution to the content of world knowledge. These initiatives in Nigeria's university system are a recent development and are changing the culture of research, knowledge production and dissemination.

This development seems to pose serious challenges such as computer skills and usability (the ability to use a computer in accessing, manipulating, and evaluating electronic information resources and devices) to postgraduate students in their utilization of ICT-based library resources in Nigerian universities. Hence the use of ICT-based library resources by postgraduates is low in Nigerian universities. Gill and Dalgarno (2008) observed that "despite significant political will and spending by governments on electronic resources, levels of ICT integration in schools for learning and teaching are often low." Studies such as Ureigho et al. (2006) Ajuwon (2003) found that "access to and use of electronic resources is low in Nigeria." Besides the problem of inaccessibility of ICT-based library resources, other factors like ownership status of the university and influence of area of study may also contribute to the rate of use of ICT-based library resources by postgraduate students. The nature or type of course which students are doing determine their extent of ICT use, because most courses have specific requirements or include learning activities that necessitate the use of the library's resource. Therefore, students in the department or course that require specific learning activities are likely to make full use of library resources than those courses or departments without such requirements. These challenges call for an empirical study for an in-depth understanding of the issues at play. Therefore, this study assesses the influence of university ownership status and influence of area of study as predictors of postgraduate students' utilization of ICT-based library resources for research in selected federal, state, and private universities in South-East Nigeria. Therefore, the research objectives of this study are as follows, to:

1. Ascertain the ICT-based resources available for postgraduate research in Nigerian university libraries.
2. Determine the extent of utilization of available ICT-based library resources for postgraduate research.

3. Find out the influence of university ownership status (Federal, State and Private) on the extent of utilization of ICT-based library resources for postgraduate research.

4. Determine the influence of area of study specifically Education, Social Science, and Engineering on the extent of usage of ICT-based library resource for postgraduate research.

In the light of the foregoing objectives the following research questions are addressed:

1. What are the ICT based library resources available for postgraduate research in Nigerian Universities?

2. To what extent does a postgraduate student utilize the available ICT-based library resources in research?

3. How does the University ownership Status (Federal, State and Private) influence the extent of utilization of ICT-based library resources for postgraduate research?

4. What is the influence of area of study such as Education, Social Science and Engineering on the extent of usage of ICT-based resources in postgraduate research?

The findings from this study of postgraduates' use of ICT-based library resources in postgraduate research would be significant in the formulations of ICT-based library resources use policy. Policy making institutions usually rely on research data, such as the one to be generated from this study, to assist them (policy makers) in making sound policies regarding ICT research usage. Furthermore, the National Information Technology Development Agency (NITDA) will benefit from the findings of this study. This federal agency has the responsibility for successful implementation of the National Information Technology (NIT) policy in Nigeria and may benefit from this work to improve on their performance. The results of the study will also serve as a reference point to crosscheck and validate prior assumptions. The results of the study would reveal the factors that influence ICT-based library resources adoption and use in the context of university education in Nigeria. This would provide facts that will enable the ministries of education, the National Universities Commission, university administrators and libraries to formulate appropriate ICT-based library resources use policy.

The supervisors and lecturers of postgraduate students are also expected to find the outcome of the study useful. Effective supervision of a research implies effective utilization of modern resources and current information at the right time. The research outcome will further inform both the lecturers and supervisors of postgraduate researchers about the challenges faced by the students regarding ICT-based library sources and how to address those challenges. Parts of the findings of the study will reveal the available ICT-based library resources in each

of the universities (federal, state and private) and this may form the basis for consortium formation agreements among the universities or revision of existing consortium agreements to enhance information resource sharing. It is also expected that the findings of the study would add to the data pool on this topical subject in respect of the usability and utilization of ICT resources in research. Researchers and other scholars interested in ICT-based library resources usage will also find it useful for their study.

## LITERATURE REVIEW

The review of related literature is organized in the following order: ICT-based Library resources, Importance and Functions of Academic Library, Utilization of ICT by Postgraduate (PG) Research, and Research Model. The review would provide useful background information that would aid readers understanding and appreciation of the work.

### ICT-based Library Resources

The Library according to Ikegbune (1994) is a collection of written, printed or other graphic materials (including films, slides, photography, records and other tapes) housed, organized and interpreted to meet broad and varying needs of people for information, knowledge, recreation and aesthetics. Reitz (2004) defined 'library' as a collection or group of collections of books and/or other print or non-print materials organized and maintained for use (reading, consultation, study, research, etc). Ibenne (2010) reveal that libraries are channels of delivering information. The rigid nature of the traditional role in providing information services to its respective users have been revolutionized by the advancement in information communication technologies. The library is also seen as the central unit of a dynamic system that involves information storage and retrieval (Olayinka, 2005). From the above, the library can be explained as a collection of print and non-print materials that are housed and organized to meet information, knowledge, aesthetic and recreation needs of people by means of consultation, reading and research. Library resources, as explained by Popoola (2008), is an organized collection of printed and other forms of recorded knowledge that satisfy the information needs of both present and future users. Such library resources according to the author include textbooks, journals, indexes and abstracts, monographs, theses and dissertations, newspapers and magazines, government publications, research and technical reports, encyclopedias, manuscripts, publications of international organizations, patents and standards as well as microforms. Awolola (2000) sees resources as both human and material devices which can be used for effective communication. Going by these definitions of

resources, it means any resources that supply information which are to be used in future, must be reserved or stored somewhere from where it can be assessed anytime it is needed.

The fact that resources are of different types like financial resources, military resources, mineral resources, economic resources, information resources, etc. makes where each type of resources is reserved to depend on the type of resources in question. Information resources are, however, kept in libraries and information resource centres. Encarta (2009) described resources as a source of help for information. It also explains it as a backup supply, a reserve supply of something such as money, personnel, or equipment. Hence, we can say that resources are valuable to the person in need of such things. Such things could be goods, personnel, materials or information. In this context the concept of resources is focused on those materials that supply information. From this explanation, it can be deduced that a resource is anything that helps in the supply of information while such information is kept in reserve to be supplied to anyone in need of it. In this context, library resources refer to the ICT-based resources for enhancing research works. They include equipment's and technologies provided to enhance access to the resources available to the users.

### **Importance and Functions of Academic Library**

The primary functions of an academic library are to provide resources and research funding for students and staffs of the educational institutions. Specific course-related resources are normally supplied by the library such as copies of textbooks and articles. Such materials for general class reading could be held in reserve on request for easy accessibility to all interested. Relatively recently, academic libraries are becoming increasingly digitally oriented (Mostfa, 2005). This means that the library provides 'gateway' for students and researchers to access various resources, both print/physical and digital (bells, 2005). Academic libraries are subscribing to electronic journals and databases, providing research and scholarly writing software, and usually offering computer workstations or computer labs for students to access journals, library search databases and portals, institutional electronic resources, internet access, or task related software (that is, word processing, and spreadsheet software). They are increasingly acting as repositories of electronic information and service providers for retrieving and interpreting information. Libraries often provide public facilities for access to their electronic resources and the internet (Kenny, 2004).

Modern libraries are increasingly being redefined as places to obtain unrestricted access to data in many formats and from many sources. They are expanding services beyond the physical walls of a building by providing materials accessible by electronic means, and

by providing the assistance of librarians in navigating and analyzing very large amounts of information with a variety of digital tools.

Academic libraries are mostly placed on the campuses for institutional scholarly research and academic work, such as the collection and creation of digital copies of the student's thesis and dissertations (Cohen, 2007). This study will assess the utilization of ICT-based library resources by postgraduate students in conducting research in universities in South East Zone of Nigeria. In doing so, the extent of availability of ICT-based library resources in the universities will also be determined. There are six geo-political zones in Nigeria North Central, Northeast, Northwest, Southwest, South-South, and southeast. The southeast zone was chosen because it is the most populated zone in terms of academics in Nigeria; has federal, state, and private universities in all the states.

### **Utilization of ICT by Postgraduate (PG) Research**

Full utilization of ICT resources has not always been achieved in developing countries. Utilization of ICT library resources has always been accompanied with mixed reactions on the part of the users. While some people view the library as a place for consulting different material which they cannot personally afford to buy, others regard it as an office where someone can understand and be free from distractions when preparing for exams. To others, it is an exclusive and Spartan place where only a privileged few could go. These and many other uses to which ICT libraries are being put to are expressed by different authors. It is believed that the utilization of ICT-based library resources are restricted to students who have assignments', term papers, researches and examinations to write. Nwokocha (1993) affirms that most of those who make use of ICT resources in Owerri and Umuahia are students preparing for their exams. The implication is that most of them visit to read their own books and do not borrow from the library. Only a few bother to consult reference and audio-visual materials, citing ignorance of their existence as the most common reason. Thus we find that students in such area hardly visit the library when they have no assignments or exams to write.

The above view is further buttressed by the submission of Kramer (2007) that users of online library resources are mostly graduate (the majority of them doctorate) "mid-career" students, of average age in the mid 40s; in other words, not a "traditional" university students group. Implying that it is those postgraduate students that receive more assignments, seminars and research report to write that do make better use of the library resources than the undergraduate students who has less paper or research reports to write. In another dimension, students' use of ICT-based library seems not to be restricted to studying or in consulting books alone. These other forms

of uses were reported by Nagata et al. (2008) that students' responses concerning their library use, vary from chatting to using PCs. They grouped learners through cluster analyses, into four groups as: a learner group, a strollers group, an extended user group, and a place and PC user group. The library usage patterns of these groups argued that the topmost group utilized library resources for learning task. The next group came to the library from the time to time to look for (browse) interesting books. The third group showed the highest rate in using the ICT library as a place to chat with friends. With this group, the library is a place to use in group or to use PCs rather than for its resources. The fourth group, tended to come to the library to use it as a place and to use PCs. This group is the second largest. The first group (learners), the third (extended use group, in other words socializes) and the fourth group (place and PC users) are easily identified in every day library setting and thus they are easily understood.

The second group, the strollers group, however, happened to be a surprise, although the concept was conceivable as a possibility. Aina (2004) also had a similar experience when he found that library users make use of a library for specific reading, especially those preparing for examinations, undergoing formal education and professional development, research and related needs. Others use library for recreation and entertainment. Stressing more on the above assertions, Nagata et al. (2008) stated that there are several types of students' ICT library use. Some thought that the library was indispensable for their study and others used it as a place where they could rest; chat with friends or just to spend time. As for the library resources, some utilized them only for class assignments and others also for their own pleasure, their reading guided by their own whims. There were some who never checked out library materials, and others whose sole purpose of visiting the library were to use the computers, while others used them for the preparation of presentations and conference papers. Others mentioned book selection, easy communication through the internet, and acquisition of information on courses. However, other opinions believed that better utilization of ICT library resources were being achieved in some libraries. Olivia and Madison (2006) reported that the library is one of the most heavily-used buildings on their campus, and that students make substantial use of its collection, services, and study space.

In addition to the physical collections, students have access through the internet to the "e-library" whether they are in the library, in campus computer labs, at homes, or in residence halls or apartments. The author stated further that statistics collected showed that usage of both the e-Library and library building itself is substantial. Over 340, 000 items were circulated while approximately 310,000 were used in-house. Of these items, approximately 24,000 were loaded to other institutions,

while 17,000 were borrowed from other institutions. This same view of adequate utilization of ICT library resources was also shared by Ajayi and Adebayo (2005) based on their studies on staff and students of Obafemi Awolowo University. They discovered that library resources were maximally utilized in the library. Although, the above authors believed that ICT library resources were well utilized, this cannot be generalized to all institutions. The reason behind the success in the utilization of library resources at that institution may result from various factors which are not found in other institutions. Therefore comparability or generalization of such findings may be difficult until the underlying factors are extensively researched into. Yet, in spite of the fact that most libraries could not boast of full utilization of all their library resources; there are still some aspect or forms of the library resources that are being used in those libraries. Some libraries may attain full utilization of a particular or few types of resources while other resources may be having low patronage.

A survey conducted by Echezona (2005) revealed that academic staff in the education of the University of Nigeria, Nsukka frequently used journals, conference papers and seminar; while social scientists consulted books, journal, reference works more than other information sources. This indicates that students and staff use of library resources depends on the sources from which they perceive will hold more data on their discipline. Therefore, those library resources which such students and staff discover hold more information for their discipline is more likely to be patronized than other library resources. This point is also revealed by the findings of Popoola (2000) that, academic, social scientists in the Nigerian Universities utilized the following library information services: current awareness, photocopying, referencing, statistical data analysis, E-mail, selective dissemination of information and on-line database searching, than the other in their research activities. Moreover, Agaba (2005) revealed that users make use of electronic library resources, mainly due to some of the benefits accruing from the use of these resources. Many of the respondents stated that they used these resources for research. This involved retrieval of current literature reviews, personal research, and accessibility to latest research developments in the academic world. Some were using them for teaching purposes. Implying that their use of this particular type of library resources was informed by the benefits which they derive from it and those which they cannot find in other type of library. Agaba (2005) also found that respondents pointed out that CD-ROM database were some of the resources that they utilized. Many used mainly electronic journals, and some electronic document delivery.

On the other hand, study by Nwegbu (2004) on the availability and utilization of audio-visual resources in Nigerian University libraries showed that lecturers did not make use of audio-visual library resources due to poor

funding, non-availability of resources and irregular supply of electricity. Although the author did not specify that other types of library resources are fully utilized, but the tone of the report showed that the use of audio-visual resources was nonexistent. The experience of Okiy (2000) may not be different from that of the previous author (Nwegbu) because she reported that students and Faculty staff in the Delta State University, Abraka, Nigeria made use of book materials such as newspapers, journals, textbooks, magazines, projects, dictionaries, encyclopedias and government document. This means that their utilization of other library materials like audio-visual, e-library and other forms of electronic resources was nothing to comment about. All thus affirmed the fact that one or a few types of library resources were being used while others suffered negligence even when they were available and accessible. Furthermore, the kind of course which students were doing served to determine their extent of ICT use. According to Thomas and Stratton (2006), most courses have specific requirements or include learning activities that necessitate the use of the library's resources. These activities range from reviewing current journal articles; preparing literature reviews and research papers on specific topics in the field; preparing team presentations; independent study projects; informational searches for take home examinations and review questions; and applied case study projects with theoretical bases.

To complete the various activities noted, students are required to use a variety of resources in the library both current and historical and both theoretical and applied. This means that students in the department or course that require all these activities are likely to make full use of library resources than those courses or departments without such requirements. Thus, the nature or type of course which students undertake also serves to determine the level of student's library usage. The place where the library is situated may also influence the extent of use of ICT library resources. This has to do with the distance which the library user will have to cover before he/she can get to use library resources. Some people are discouraged to visit the library when such library is far from their department. This has been one of the reasons why most people prefer going to the internet rather than visit the libraries. Even in institutions where e-libraries are available, most people tend to prefer accessing the resources with their own computers if given the access than going to the libraries. This situation was reported by Agaba (2005) that 57% of those who used electronic information resources, used University Library computers, while 38% made use of departmental internet facilities, and 20.3% respondents used those in their offices. This is to show that not everyone using the library was well disposed to covering long distances before he/she could be able to make use of any library resources. As a result most people would prefer using their personal computers to access the electronic

resources of the libraries rather going to the library to make use of other resources housed in the library building.

### **Research Model**

The research model adopted for this study is based on the Diffusion of Innovation Theory (DOI). DOI is the process by which an idea perceived as new by the individual is communicated through certain channels over time. Much research from a broad variety of disciplines has used the model as a framework. Dooley (1999)a and Stuart (2000) mentioned several of these disciplines as political science, public health, communications, history, economics, technology, and education, and defined DOI theory as a widely used theoretical framework in the area of technology diffusion and adoption. DOI theory is the most appropriate for investigating the adoption of technology in higher education and educational environments (Medlin, 2001; Parisot, 1995). DOI theory has been adopted in several studies in Library and Information Science. Among these are the works of Lancaster and Lee (1985) in their study of the diffusion of the term acid rain, Lindhol-Romantschuk (1994) in her study of the diffusion of monographs representing the humanitarian and the social sciences and Kajberg (1996) in his study of the diffusion of ideas from foreign countries into Danish Library and information science. Oromaner (1986) has studied the diffusion of publications representing a special field in American sociology into mainstream sociology, Kortelainen (2001) the international diffusion of a national scientific journal and Rogers and Scott (1997) in a study on the DOI model and outreach from the national network of libraries of medicine to native American communities.

In Nigeria, Agbonlahor (2005) used the DOI theory when she studied the utilization level and attitudes towards information technology among Nigerian university lecturers. The research model proposes that there exist some relationships and interactions between some variables and utilization of ICT-based library resources by postgraduate researchers in Nigerian universities. First, it is proposed that University status and discipline of study correlate with utilization of ICT-based library resources by postgraduate researchers. Secondly, it is proposed that the relationship between University status and discipline of study would predict utilization of ICT-based library resources by postgraduate researchers in universities (federal, state, and private) located in south-east Nigeria. The schematic diagram of the relationship between variables of the study is shown below (Figure 1).

## **METHODOLOGY**

### **Hypotheses**

The following null hypotheses have been formulated to

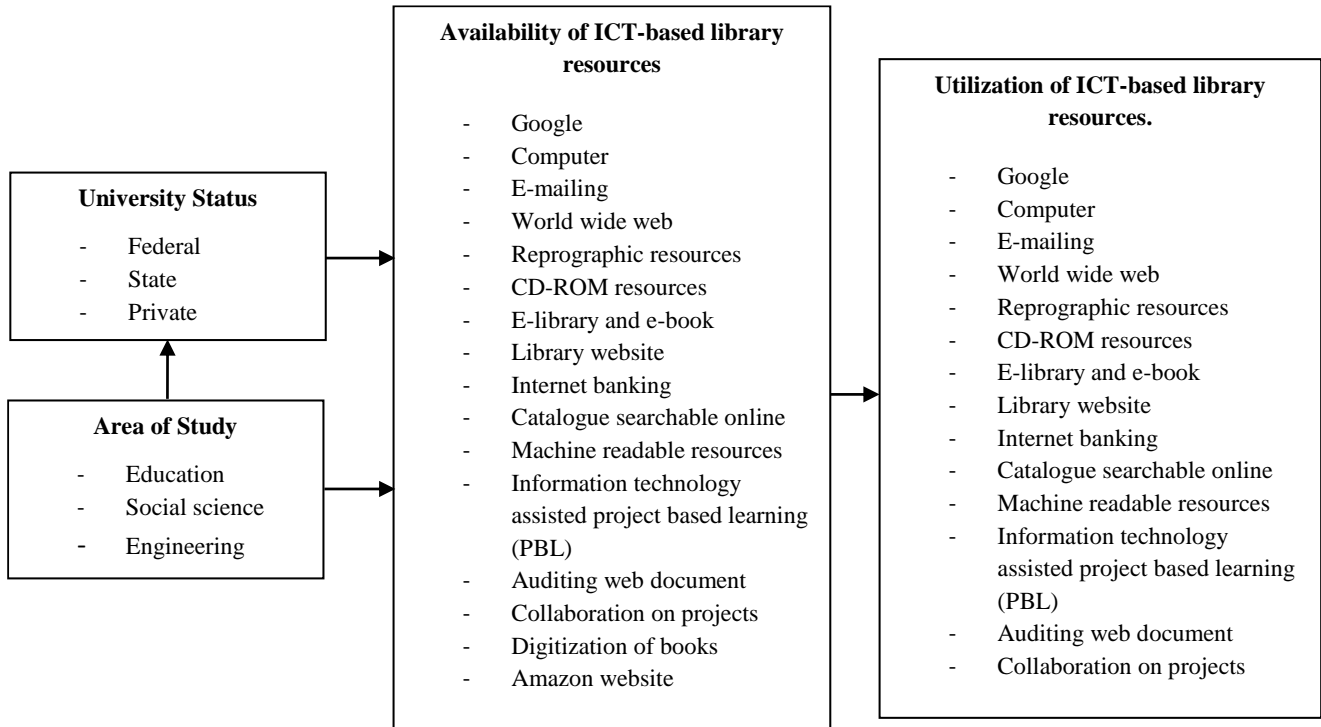


Figure 1. Schematic diagram of the relationship between variables of the study.

guide the study and will be tested at 0.05 level of significance.

**Ho<sub>1</sub>:** There is no significant relationship between the university status (Federal, State and Private) and their utilization of Information and communication Technology-based library resources in universities in South-East Nigeria.

**Ho<sub>2</sub>:** There is no significant relationship between the postgraduate researchers' areas of studies (Education, Social Sciences, and Engineering) and their utilization of Information and communication Technology-based library resources for research in universities in South-East Nigeria.

## MATERIALS AND METHODS

The study was carried out in South East Zone of Nigeria. The states in the South East include Abia, Anambra, Ebonyi, Enugu and Imo States. In the area, there are five (5) Federal Universities, five (5) State Universities and seven (7) Private Universities as shown in appendix A. The selected Universities are federal—University of Nigeria, Nsukka, in Enugu State; State – Ebonyi State University, Abakiliki, in Ebonyi State; Private – Madonna University, Okija in Anambra State in the south-east of Nigeria. The selection was done based on the universities that run postgraduate studies and availability of ICT-based library resources (Table 1); using a purposive sampling technique. Also, three faculties were purposively selected from each university. The faculties

were: Education; Social Sciences and Engineering. These are common in most universities. The extent of utilization of ICT-based library resource in these university libraries by their postgraduate or research students was assessed. The Universities considered here are federal (University of Nigeria, Nsukka), State (Ebonyi State University, Abakiliki), and private (Madonna University, Okija Anambra). Only these three (University of Nigeria, Nsukka, Ebonyi State University, Abakiliki, and Madonna University, Okija) meet the study selection criteria. Others either they don't run postgraduate programme or they do not have the faculties selected for the study.

## Sample and Sampling Techniques

Three (3) universities comprising of one federal universities, one state and one private university each were purposively sampled from the 17 (seventeen) universities in South East Zone. The selected universities, their status and state of location are shown in the appendix. From each sample university, three (3) faculties were sampled using purposive sampling technique. The faculties of Education, Social Sciences, and Engineering were sampled for the study. The choice of these faculties for the study was based on the fact that they (Education, Social Sciences, and Engineering) generate the highest number of postgraduates' in Nigerian universities (Ovute and Ugwuanyi, 2011). The sampled faculties yielded the following number of postgraduate students: Education - 96; Social Sciences –

**Table 1.** Availability of ICT-based library resources.

S/N	ICT-based library resources	Availability			Remark
		UNN	Madonna	Ebonyi	
	Computer facilities				
1	Computer	Yes	Yes	Yes	3/3
2	Laptops	Yes	Yes	Yes	3/3
	Telecommunication Technology				
3	Online catalogue	Yes	Yes	Yes	3/3
4	Library website	Yes	Yes	Yes	3/3
5	E-learning/Discussion group	Yes	No	No	1/3
6	Web-documents	Yes	No	No	1/3
7	E-library and e-book	Yes	Yes	No	2/3
8	Internet	Yes	Yes	Yes	3/3
9	Usenet newsgroup	No	No	No	0/3
10	Tele-communication facilities	No	Yes	No	1/3
11	Network	Yes	Yes	Yes	3/3
12	Resources sharing and collaboration on project	Yes	Yes	No	2/3
	Other Electronic Devices				
13	Telephone	No	Yes	No	1/3
14	Television	No	No	No	0/3
15	Radio	No	No	No	0/3
16	Slides	Yes	Yes	No	2/3
17	Projector	Yes	Yes	No	2/3
18	Facsimile (online printing)	No	No	No	0/3
19	Machine readable resources for example, CD-ROM	Yes	Yes	Yes	3/3
20	Reprographic resources (for example, photocopying Machine)	Yes	Yes	No	2/3
21	Bar-code reader	No	No	No	0/3
22	Close Circuit T.V (Network)	No	No	No	0/3
	Total	14/22	13/22	5/22	

155; and Engineering - 115. These were postgraduate students who were registered and carrying out research in their respective universities at the time of the data collection. In all, three hundred and sixty-six (366) postgraduate students were sampled for the study.

### Instrument for Data Collection

The instruments used in data collection included a questionnaire called Assessment of Utilization of ICT-based Library Resources Questionnaire (AUICTBLRQ). It was developed by the researchers. The instrument is divided into two sections, A and B (as shown in appendix B). Section A elicits information on the personal data of the respondents in respect of status of university (Federal, State or Private) and Faculty of the postgraduate students (Education, Social Science, or Engineering). Section B is subdivided further into 2 parts as follows: Part 1 seeks information on the availability of some identified ICT-based library resources at the University, while Part 2 seeks information on the extent of utilization of ICT-based resources available in the University. A four-point Likert type rating scale of very highly available/utilized (4), highly available/utilized (3)

moderately availability/utilized (2) and not available/utilized (1) point was adopted in rating the extent of availability and utilization, respectively.

### Method of Data Analysis

The research questions were analyzed using mean and standard deviation. The hypotheses were tested using analysis of variance (ANOVA) statistics. The mean score of each item was compared with the real limit of numbers in answering the research question as follows: 0.50 to 1.49 (Not Available/Utilized); 1.50 to 2.49 (Moderately Available/Utilized); 2.50 to 3.49 (Highly Available/Utilized) and 3.50 to 4.00 (Very highly Available/Utilized).

### RESULTS

Figure 2 shows that out of the total of 510 questionnaires administered, 366 (72%) were successfully returned. Of this figure, according to category of respondents, 140 questionnaires were administered to faculty of Education but 96 (69%) were returned, 200 to faculty of Social Sciences but 155 (78%) were returned, while the faculty



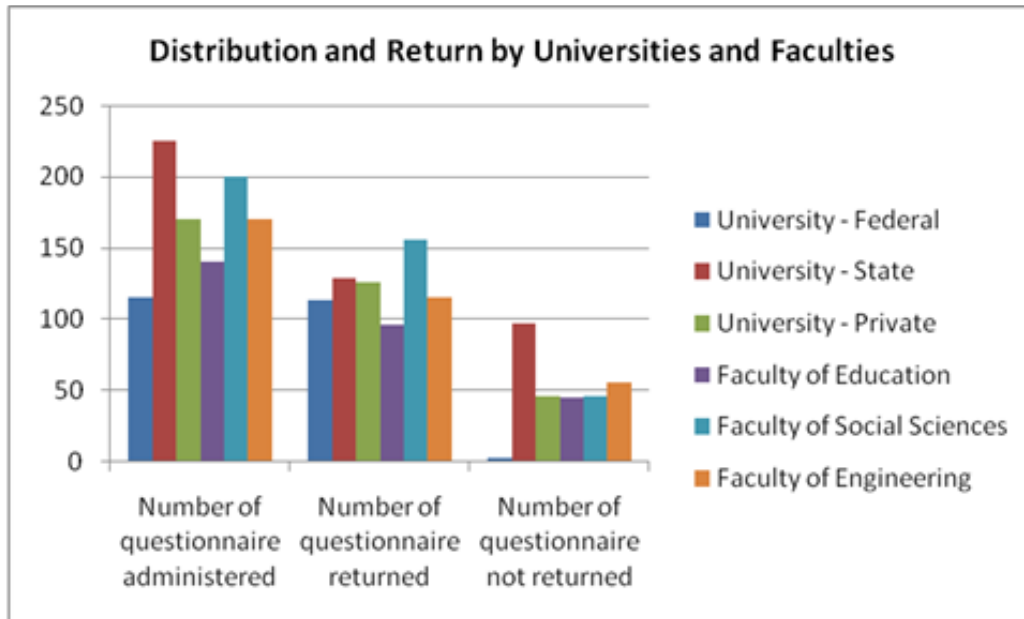


Figure 2. Distribution and return by universities and faculties.

of Engineering received 170 but 115 (68%) were returned. In real numbers, faculty of Social Sciences returned the highest number, followed by the faculty of Engineering with 155 (78%) and 115 (68%), respectively. Distribution and return by institutions shows that 115 went to federal university but 113 (98%) were returned while the state university received 225 but 128 (57%) were returned. Similarly, private university got 170 with 125 (74%) returned. On the whole the return rate of the questionnaire was moderate. The details by category of respondent by the institution are shown in Figure 2. The table 2 shows the availability of ICT-based library resources at the three university status by the researchers. The result indicates that the resources were more very highly available in private university (34.8%), followed by state university (33.3%) and least very highly available is federal (27.9%). In the case of highly available, the resources were found to be most highly available in a federal university (26.4%), followed by the private university (26.1%) and least state university (24.1%).

The resources were more moderately available in a federal university (26.6%), followed by state university (25.4%) and least private university (22.2%). The Table 3 shows the utilization of ICT-based library resources at the three university status by the researchers. The result indicates that the resources were more very highly utilized in private university (34.3%), followed by state university (32.7%) and least very highly available is federal (25.7%). In the case of highly utilized, the resources were found to be most highly utilized in private university (25.8%), followed by federal university (25.3%) and least state university (24.1%). The resources were

more moderately utilized in a federal university (25.1%), followed by state university (24.0%) and least private university (23.2%). The results in Table 4 show the extent to which researchers utilized ICT-based library resources by the three categories of Universities by the mean and standard deviation of each of twenty-two items. Comparing strictly among the three universities, the result shows that the private university had the highest number of items utilized followed by state university and finally federal. The private university scored highest on sixteen items utilized. They are library website, Usenet newsgroup, tele-access, tele-presence, auditing web document, information technology assisted project based learning (PBL), Computer, Laptops, online catalogue, Library website, E-learning/Discussion, Web document E-library and e-book, internet, Usenet News group; while state scored highest on the remaining six items utilized (Telecommunication resource, Fascine (online printing, Machine readable resources for example, CD-ROM. Bar-Code Reader, Close circuit TV (network) Usenet net group, whereas federal scored all low. The results in Table 5 show the extent to which researchers utilized ICT-based library resources by the three faculties by the mean and standard deviation of each of twenty-two items. Comparing strictly between the three faculties, the result shows that the Faculty of Education has the highest number of ICT-based library resources utilized followed by the Engineering and finally Social Sciences. The Faculty of Education scored highest on fifteen items utilized. These are computer, laptop, online catalogue, library website, E-learning/discussion group, Usenet newsgroup, web document, E-library and e-Book, Internet, world wide web, CD-ROM resources,

**Table 2.** Level of availability of ICT-based library resources for research purposes.

S/N	Items	UNN				Ebonyi				Madonna			
		VHA	HA	MA	NA	VHA	HA	MA	NA	VHA	HA	MA	NA
1	Computer	23	37	40	13	43	25	38	22	45	31	29	20
2	Laptops	24	42	31	16	31	42	45	10	36	47	37	5
3	Online catalogue	22	26	36	29	34	29	31	34	33	34	40	18
4	Library Website	23	35	30	25	38	22	38	30	29	34	36	28
5	E-Learning /Discussion group	20	25	44	24	28	29	35	36	25	22	36	42
6	Web document	11	19	46	37	25	25	28	40	21	31	32	41
7	E-Library and e-Book book	15	30	38	30	22	34	31	41	22	30	36	37
8	Internet	15	28	35	35	24	25	40	39	22	24	35	44
9	Usenet newsgroup	12	22	33	46	22	21	47	38	21	19	36	49
10	Tele-communication facilities resources	16	38	40	18	22	42	45	19	29	39	34	23
11	Networks	21	30	40	22	26	38	45	19	24	43	41	17
12	Resources sharing and collaboration on project	21	33	30	29	29	47	33	19	37	43	32	13
13	Telephone	34	37	29	13	47	38	31	12	32	52	29	12
14	Television	19	20	31	43	29	30	36	33	32	30	27	36
15	Radio	68	27	12	6	64	33	20	11	79	31	9	6
16	Slides	36	30	28	19	35	30	40	23	48	32	27	18
17	projector	25	40	20	28	40	29	32	27	40	40	29	16
18	Fascine (online printing)	33	33	30	17	59	29	29	11	51	34	28	12
19	Machine readable resources for example, CD-Rom	54	27	20	12	72	23	24	9	76	27	12	10
20	Reprographic resources (for example, photocopying machine)	66	24	17	6	85	24	15	4	81	28	11	5
21	Bar Code Reader	69	28	11	5	87	26	14	1	92	24	5	4
22	Close circuit T.V (Network)	65	24	19	5	72	35	16	5	83	23	11	8
	Total	692	655	660	478	934	676	713	483	958	718	612	464
	Percentage (%)	27.9	26.4	26.6	19.2	33.3	24.1	25.4	17.2	34.8	26.1	22.2	16.9

Reprographic resources, telecommunications, Fascine (online printing machine), and E-mail; while Engineering had the highest utilization on six items (E-learning/discussion group, collaborate on project, slides, projector, assisted project based learning. (PBL), Bar-code reader, close circuit T.V (Network), and Machine readable resources); whereas Social Sciences scored highest only on (E-library and E-book).

### Hypothesis One

There is no significant relationship between the postgraduate researchers' university status (Federal, State and Private) and their utilization of Information and Communication Technology based library resources for postgraduate research in the universities located in South-East Nigeria. Table 6 shows that the F calculated (4.826) was greater than the P - value (0.009). The null hypothesis was therefore not accepted. In other words, there is a significant difference in the mean ratings of postgraduate students in Federal, State and Private universities on the utilization of ICT-based library

resources for postgraduate research.

### Hypothesis Two

There is no significant relationship between the postgraduate researchers' areas of studies (Education, Social Sciences, and Engineering) and their utilization of Information and communication Technology based library resources for research in the universities located in South-East Nigeria. Table 7 result shows that the F-ratio calculated (1.911) was greater than the significant value (0.149). Thus, the null hypothesis is rejected. In another development, the P-value is higher than 0.05 significant level, the null hypothesis is accepted; this significant test is evidence that not all group means are equal and does not show a statistically significant relationship owing to the number of questionnaires returned by faculties as shown in Figure 2. In other words, there is 'non-significant' difference (bordered on but was not less than the accepted level of significance) in the mean ratings of postgraduate researchers in the Faculties of Education, Social Sciences and Engineering on the extent of

**Table 3.** Extent of utilization of ICT-based library resources in postgraduate research.

S/N	Items	UNN				Ebonyi				Madonna			
		VHU	HU	MU	NU	VHU	HU	MU	NU	VHU	HU	MU	NU
1	Computer	18	47	30	18	39	33	29	27	40	28	31	26
2	Laptops	23	35	35	20	40	35	42	11	37	39	39	10
3	Online catalogue	14	24	40	35	29	32	41	19	30	35	40	20
4	Library Website	20	27	34	32	28	41	41	18	29	30	41	25
5	E-Learning /Discussion group	16	33	29	35	34	23	32	39	27	24	40	34
6	Web document	12	25	34	42	20	30	29	49	13	33	44	35
7.	E-Library and e-Book book	17	27	29	40	19	22	42	45	21	28	33	43
8	Internet	14	22	34	43	20	22	40	46	23	25	27	50
9	Usenet news group	15	18	34	46	22	26	38	42	23	24	31	47
10	Tele-communication facilities resources	19	30	38	26	30	41	33	24	18	50	34	23
11	Networks	14	29	39	30	28	30	41	29	31	38	34	22
12	Resources sharing and collaboration on project	19	30	39	35	30	43	31	24	29	47	38	11
13	Telephone	33	37	29	14	39	41	36	12	42	48	21	14
14	Television	12	26	23	52	30	26	32	40	33	21	36	35
15	Radio	63	28	13	9	80	8	13	7	83	24	10	8
16	Slides	31	27	33	22	45	25	33	25	44	35	33	13
17	projector	29	31	24	29	40	33	32	29	39	41	31	14
18	Fascine (online printing)	32	36	24	21	47	38	30	13	54	33	28	10
19	Machine readable resources for example, CD-Rom	45	30	23	15	68	30	18	12	74	25	17	9
20.	Reprographic resources (for example, photocopying machine)	60	23	19	11	79	23	14	10	88	29	6	2
21.	Bar Code Reader	71	23	10	9	85	22	13	8	88	24	12	1
22	Close circuit T.V (Network)	64	24	14	11	68	33	14	13	78	27	13	7
	Total	641	632	627	595	920	677	674	542	944	708	639	459
	Percentage (%)	25.7	25.3	25.1	23.9	32.7	24.1	24.0	19.3	34.3	25.8	23.2	16.7

utilization of ICT-based library resources for postgraduate research.

## DISCUSSION OF THE FINDINGS

The findings of this study were discussed in terms of availability of ICT-based library resources for research purposes, and the extent of utilization of ICT-based library resources in postgraduate research.

### Availability of ICT-Based Library Resources for Research Purposes

The data presented showed that some ICT-based library resources were available in university libraries. Using the real limit of numbers, with twenty-two (22) ICT-based library resources studied in the federal, state, and private university, respectively shows that these ICT-based library resources for research purposes are highly available. The study found a high level of availability of ICT-based library resources to researchers in the three universities assessed. Institution-wise, the resources were reported to be more available to a private university,

followed by a state university. By area of study, availability was reported mostly by Faculty of Education, followed by the Faculty of Engineering across the three universities under study. This result was not surprising because, the reason why researchers in the Faculty of Education utilized ICT-based resources more than those in social science and Engineering could be that ICT provides more information to researchers in education discipline than those in social sciences and Engineering. A study conducted by Echezona (2005) revealed that researchers in Education of the University of Nigeria, Nsukka frequently used journals, conference papers and seminar papers while social science researchers consulted books, journals, and reference books more than other information sources. This point to the fact that the researchers' use of library resources depends on the source from which they perceived would hold more information on their discipline.

This finding is in line with that of Croom (2002) that from the 1990s up to date, rapid advances in technology have provided postgraduate researchers with ICT resources as an alternative to the traditional university library materials. It is also supported by Mostafa (2005) who noted that

**Table 4.** Mean and standard deviation of the respondents' rating on the influences of university status on utilization of ICT-based library resources.

S/N	Items	Federal		State		Private		Total	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	Computer	2.58	0.943	2.66	1.125	2.66	1.137	2.63	1.074
2	Laptops	2.54	1.009	2.81	0.978	2.82	0.951	2.73	0.984
3	Online catalogue	2.15	1.002	2.60	0.999	2.60	1.024	2.46	1.027
4	Library Website	2.31	1.070	2.62	0.981	2.50	1.060	2.48	1.041
5	E-Learning /Discussion group	2.27	1.052	2.41	1.180	2.35	1.102	2.34	1.114
6	Web document	2.06	1.011	2.16	1.107	2.19	0.965	2.14	1.029
7	E-Library and e-Book book	2.19	1.082	2.12	1.055	2.22	1.097	2.17	1.075
8	Internet	2.06	1.038	2.12	1.072	2.17	1.148	2.12	1.086
9	Usenet news group	2.02	1.052	2.22	1.086	2.18	1.132	2.14	1.092
10	Tele-communication facilities resources	2.37	1.019	2.60	1.045	2.50	0.956	2.50	1.009
11	Networks	2.23	0.991	2.45	1.071	2.62	1.045	2.44	1.047
12	Resources sharing and collaboration on project	2.29	1.083	2.62	1.043	2.75	0.913	2.56	1.028
13	Telephone	2.79	1.004	2.84	0.970	2.94	0.978	2.86	0.983
14	Television	1.98	1.061	2.36	1.155	2.42	1.158	2.26	1.141
15	Radio	3.28	0.959	3.41	0.883	3.46	0.894	3.39	0.911
16	Slides	2.59	1.091	2.70	1.146	2.88	1.013	2.73	1.088
17	projector	2.53	1.134	2.70	1.097	2.84	0.995	2.70	1.079
18	Fascine (online printing)	2.70	1.076	2.93	1.005	3.05	0.991	2.90	1.030
19	Machine readable resources for example, CD-Rom	2.93	1.067	3.20	1.007	3.31	0.962	3.16	1.021
20	Reprographic resources (for example, photocopying machine)	3.17	1.034	3.35	0.961	3.62	0.656	3.39	0.911
21	Bar Code Reader	3.38	0.948	3.44	0.911	3.59	0.697	3.47	0.849
22	Close circuit T.V (Network)	3.25	1.014	3.22	1.003	3.41	0.890	3.29	0.970

many academic libraries in Nigeria were becoming increasingly digitally oriented. Also, Bells (2005) noted that university libraries were subscribe to electronic journals, databases, providing research and scholarly writing software, and computer workstations or computer labs for students to access journals. According to Bell, university libraries provide areas to facilitate group study and collaboration they often provide facilities' for access to electronic resources and the internet. Further, Kenny (2006) reported that modern libraries are increasingly being redefined as places to set unrestricted access to information in many formats and from many sources. They are extending services beyond the physical walls of a building, by providing materials accessible by electronic means, and by providing the assistance of libraries in navigating analyzing very large amount of information with a variety of digital tools. The finding of this study may be associated with the recent digitization of many federal university libraries by the Federal Government.

#### **Extent of Utilization of ICT-Based Library Resources in Postgraduate Research**

The discussion on the extent of utilization of ICT-based

library resources was undertaken. This was intended to find out whether researchers in the three universities studied used ICT-based resources to a great extent or not. It seeks to assess the level of use of such resources as this can have an impact on the quality of their research work. The result of data analysis showed that some ICT-based library resources utilized in postgraduate research that included: Google, Computer, World wide web (www), E – mailing, Reprographic resources, CD-ROM resources, E –library and E – book, Library website, internet banking, Machine readable resources, Catalogue searchable online, Information technology assisted project based learning (PBL), and Collaborate on projects. The finding of the study which indicated that Google was highly utilized by the postgraduate research students seems to be in line with the observation of McLaughlin and Oberman (1996) that Google is the easiest and most popular way of accessing information and resources on the internet. According to McLaughlin and Oberman (1996), Google site assists students, teachers and researchers find thousands of journals, projects, reading materials, programmes and curricular on the internet. This finding is in accordance with that of Ajayi and Adebayo (2005) who reported that

**Table 5.** Means and standard deviation of respondents rating according to area of study on extent of utilization of ICT-based library resources.

S/N	Items	Education		Social Sciences		Engineering		Total	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	Computer	2.81	0.998	2.60	1.079	2.52	1.119	2.63	1.074
2	Laptops	2.84	0.977	2.72	1.016	2.65	0.946	2.73	0.984
3	Online catalogue	2.56	1.054	2.39	0.977	2.47	1.071	2.46	1.027
4	Library Website	2.56	1.044	2.50	0.976	2.40	1.122	2.48	1.041
5	E-Learning /Discussion group	2.58	1.185	2.26	1.099	2.25	1.050	2.34	1.114
6	Web document	2.23	1.119	2.15	0.959	2.06	1.045	2.14	1.029
7	E-Library and e-Book book	2.24	1.064	2.15	1.094	2.14	1.067	2.17	1.075
8	Internet	2.15	1.105	2.08	1.066	2.16	1.105	2.12	1.086
9	Usenet news group	2.22	1.135	2.09	1.071	2.16	1.089	2.14	1.092
10	Tele-communication facilities resources	2.60	1.041	2.48	0.956	2.43	1.052	2.50	1.009
11	Networks	2.45	1.085	2.39	0.984	2.50	1.103	2.44	1.047
12	Resources sharing and collaboration on project	2.58	1.111	2.48	1.015	2.65	0.974	2.56	1.028
13	Telephone	2.96	1.025	2.72	0.979	2.93	0.943	2.86	0.983
14	Television	2.41	1.236	2.04	1.056	2.44	1.125	2.26	1.141
15	Radio	3.50	0.808	3.34	0.950	3.36	0.938	3.39	0.911
16	Slides	2.72	1.073	2.63	1.094	2.88	1.085	2.73	1.088
17	projector	2.70	1.144	2.57	1.044	2.86	1.059	2.70	1.079
18	Fascine (online printing)	2.98	1.086	2.85	0.966	2.90	1.071	2.90	1.030
19	Machine readable resources for example, CD-Rom	3.28	0.948	3.06	1.027	3.18	1.064	3.16	1.021
20	Reprographic resources (for example, photocopying machine)	3.56	0.751	3.28	0.990	3.39	0.905	3.39	0.911
21	Bar Code Reader	3.52	0.781	3.48	0.906	3.47	0.862	3.47	0.859
22	Close circuit T.V (Network)	3.46	0.870	3.15	1.027	3.34	0.954	3.29	0.970

**Table 6.** Analysis of variance (ANOVA) of the mean difference in ratings of postgraduate students from federal, state and private universities.

	Sum of Squares	df	Mean Square	F	P-value
Between groups	1838.345	2	919.172		
Within groups	69137.874	363	190.462	4.826	0.009
Total	70976.219	365			

**Table 7.** Analysis of variance (ANOVA) of the mean difference in rating of postgraduate students from various faculties (education, social science, and engineering).

	Sum of Squares	D.F	Mean Square	F	P-value
Between groups	739.537	2	369.769		
Within groups	70236.681	363	193.489	1.911	0.149
Total	70976.219	365			

there was increasing level of utilization of ICT-based resources for research purposes among the postgraduate students in Nigeria Universities. In a study conducted at

Obafemi Awolowo University, Ajayi and Adebayo found that ICT library resources are maximally utilized by the students. According to the authors, there was a

progressive increase in the number of ICT library users.

## LIMITATIONS OF THE STUDY

Based on the findings of the study the following limitations were noted, that could limit the generalization of the findings:

1. The use of only postgraduate's respondents may also limit the finding of the study because other groups such as librarians and university management cadre could have provided more valid information on the extent of utilization of ICT-based library resources.
2. The use of only three universities and three faculties in the study may have limited the generalization of the findings. This is because a larger population may have generated more responses from larger respondents.

## CONCLUSION

Many ICT-based library resources are available to postgraduate researchers in Universities (federal, state, and private) located in south-east Nigeria, to which they can tap into to carry out their research endeavours. The study also found that the majority of the researchers use ICT-based library resources for the purpose of research. Furthermore, Faculty of Education postgraduate researchers were the predominant users of ICT-based library resources, followed by the Faculty of Engineering postgraduate researchers and least so by Faculty of Social Sciences. Institution wise, private university reported the highest level of availability and use.

## RECOMMENDATIONS FOR FUTURE RESEARCH

Based on the limitations of the present study, the following suggestions were made for further studies.

1. Further research in this area should be undertaken with more universities included in the study and hence, a larger sample size to enable greater confidence in generalization of results.
2. A longitudinal study can be undertaken extending on this same topic to observe changes in the availability and utilization over time, given that universities and the public at large has tilted more of ICT resources for data storage and retrieval, it is salutary to be kept in check so that you don't lag behind in the process of information acquisition and dissemination.
3. An experimental study can be undertaken comparing those who use and those who do not use ICT-based library resources on a number of researches completed within a specified time-frame.

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## APPENDIX B. Extent of Utilization of ICT-Based Questionnaire. Questionnaire for Postgraduate Research Students

### Section A:

Please tick (√) as appropriate to you.

University Status: Federal      State      Private

Faculty base of students: Education      Social Science      Engineering

### Section B:

Please tick (√) where appropriate in the column provided

**Part 1:** level of availability of ICT based library resources for research purposes. (VHA = Very Highly Available; HA = Highly Available, MA = Moderately Available, NA = Not Available).

S/N	ICT Base Library Resources Facilities	Level of Availability			
		VHA	HA	MA	NA
1.	Computer				
2.	Laptops				
3.	Online catalogue				
4.	Library Website				
5.	E-Learning /Discussion group				
6.	Web document				
7.	E-Library and e-Book book				
8.	Internet				
9.	Usenet news group				
10.	Tele-communication facilities resources				
11.	Networks				
12.	Resources sharing and collaboration on project				
13.	Telephone				
14.	Television				
15.	Radio				
16.	slides				
17.	projector				
18.	Fascine (online printing)				
19.	Machine readable resources for example, CD-Rom				
20.	Reprographic resources (for example, photocopying machine)				
21.	Bar Code Reader				
22.	Close circuit T.V (Network)				



**Part 2:** Extent of utilization of the ICT library resources in postgraduate research. (VHU = Very Highly Utilized, HU = Highly Utilized, MU = Moderately Utilized, NU = Not Utilized).

S/N	ICT Base Library Resources Facilities	Level of Availability			
		VHA	HA	MA	NA
1.	Computer				
2.	Laptops				
3.	Online catalogue				
4.	Library Website				
5.	E-Learning /Discussion group				
6.	Web document				
7.	E-Library and e-Book book				
8.	Internet				
9.	Usenet news group				
10.	Tele-communication facilities resources				
11.	Networks				
12.	Resources sharing and collaboration on project				
13.	Telephone				
14.	Television				
15.	Radio				
16.	slides				
17.	projector				
18.	Fascine (online printing)				
19.	Machine readable resources for example, CD-Rom				
20.	Reprographic resources (for example, photocopying machine)				
21.	Bar Code Reader				
22.	Close circuit T.V (Network)				