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Assessment of ICT Infrastructure Availability for Effective Service Delivery in Nigerian Academic Libraries

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Abstract
The level of availability of information and communication technology (ICT) infrastructure in Nigerian academic libraries is gradually increasing. Some libraries have made significant advancements in terms of providing access to educational resources through the integration of ICT tools. This is improving the learning experience of students and researchers. More libraries are investing in updating and improving their technological resources. This study investigated the level of availability of ICT infrastructure in some selected public university libraries in southwest Nigeria comprising twelve state and federal universities libraries. Questionnaire were administered to 376 library staff comprising of academic librarians and library officers. Descriptive analysis was employed and the result was presented in tables of frequency counts and percentages. Findings showed that ICT infrastructures were available in the selected libraries, the level of availability was considered to be at a moderate level with ongoing efforts to further enhance it. It was recommended that library management should prioritize constant acquisition of ICT infrastructure for improved library services.
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1.0 Introduction

Information and Communication Technologies (ICTs) have brought about tremendous transformations in the world of information and particularly to libraries and information services. Development in microcomputers and telecommunications led to the growth of ICTs applications. ICT is a broad concept that includes computer technology, communication technology, micrographic, reprographic, and printing technology (Sarfaraj, & Sangeeta, 2024). The utilization of ICTs in general and the computer and internet, in particular, enable library resources all over the world to be accessed rapidly. ICT plays a cogent role in information and knowledge management. The development brought by ICTs in academic libraries includes Communication technology, Mass storage technology, and Computing technology. These have changed the way libraries access, retrieve, manipulate, store and disseminate information to their clients (Odionye, 2016). The availability and use of information and communication technology has become widely accepted globally because its application to everyday operations of organizations and institutions is making tasks more effective and easier. ICTs are utilized in the library for the provision of adequate security services, creating repositories of digital libraries and initiation of capacity building program in the area of staff development (Kamalakar, 2023)

Academic libraries are not left out in this universal transformation as it is an integral part of the university. Information and communication technology (ICT) have been seen differently by various researchers. ICTs is the application of computers and other technologies to the acquisition, organization, storage, retrieval, and dissemination of information. Library services that were initially carried out manually have been changed. In recent times, every Nigerian university has come to know the place of ICTs in changing its library services. Therefore, the utilization of information and communication technology in the library simply connotes executing manual or traditional library services applying technological devices. It allows for easy handling of information in the library. The need for an anticipatory approach to an organization's communication and dissemination of information through the application of ICTs is unavoidable. The result of globalization and information age which the global community finds itself calls for review and redirection of library services to meet the user's needs (Oghenenovo, 2016). Geographical locations are no more barriers in librarianship since information and communication technologies have improved their professional practices. As the world is moving from paper to a

digital world, libraries are motivated to involve in this transformation because development in ICTs has provided libraries with new opportunities to enhance better services and resources.

1.1 Statement of the Problem

Libraries have experienced a great change from purely traditional and manual services to a technologically driven system. Availability and level of utilization of ICT facilities in academic libraries are evident in advances that ICT is bringing about in terms of a knowledge-based economy and global based interconnectivity. Maximum adoption and availability of ICT infrastructure are predominant in academic libraries of developed nations which help in meeting their institutional goals and enhancing their library staff delivery services. Availability of ICT in academic library has certainly influenced its information delivery services and added to the technical development of the library. ICT is taking a central place in almost all the sectors of the society including teaching, learning, and research (Olayemi, Umar et al, 2017).

From the perspective of Nigeria, it has been observed that ICT infrastructures are not available up to expectation in some academic libraries in spite of its significance. Even where they are available, some are obsolete. This is not the same with the developed nations where ICTs are available to perform almost all the tasks carried out in their academic libraries and thereby controlling the avalanche of information both in hard and soft copies. This study is carried out to find out the level of ICT infrastructures availability in the academic libraries of some public universities in Nigeria.

1.2 Objective of the Study

The main objective of this study is to find out the level of ICT availability in Nigerian academic libraries.

1.3 Research Question

What are the available ICT facilities/infrastructures in public university libraries in Nigeria?

1.4 Scope and Limitations of the Study

The scope of this study is limited to the level of availability of ICT infrastructures in Nigerian public University libraries. Some public universities (Federal and State) were selected from southwest geopolitical zone of Nigeria. The library staff (librarians and library officers) of twelve (12) selected public universities were used for the study.

1.5 Significance of the Study

The study would be significant to library management, tertiary institutions, students, and researchers in public universities in south west Nigeria. The information gathered would be profitable for decision making in acquiring ICT infrastructure for library use and for improved library services.

2.0 Literature Review

2.1 Concept of ICT

Information and Communication Technology (ICT) is the application of computers and communication technology for gathering, processing, storage and dissemination of information to the concerned users in the form of information products. ICT is an umbrella term that includes all technologies for the manipulation and communication of information. It is referred to as technology that transmits, stores, creates, displays and shares information by electronic means. Amaoge (2015) opined that the place of information and communication technology in achieving an organization's strategic goals can never be overemphasized. Information and Communication Technology (ICT) is a term that has various meanings. It is referred to as technology that provides access to information through telecommunications. ICT can be used to create, store, analyze, organize, retrieve and disseminate digital information (text, images, sounds) in digital libraries or any other type of information center (Seena & Sudhier, 2014). The term 'Information and Communication Technology' was described as "All varieties of electronic systems used for broadcasting telecommunications and mediate communications" together with personal computers, video games, cell phones, net, and electronic payment systems, etc. (Ramalinga, 2016). ICT is a device or tool that allows for the collection, storage, processing or the communication of information. We are living in an era of information explosion where the desire to prevail over the impediments to information is Information and Communication Technologies (ICTs). ICT has transformed the way and manner we access information. ICT gives library opportunity to digitize traditional services and establish effective relationships, collaboration and resource sharing networks (Kamalakar, 2023)

2.2 Awareness and Availability of ICT Infrastructures in Academic Libraries

The level and speed of revolution that is happening globally in the field of information and communication have completely improved the expectation of libraries. It is seen that the growth of ICTs has greatly metamorphosized information and its dissemination. Edidiong, & Enyene, (2014) assessed the availability and utilization of ICT facilities for effective service delivery in academic libraries in Nigeria. Since the beginning of the 21st Century, libraries automation has come to stay and since then library services delivery has undergone changes from purely manual to modern technology-driven, the aftermath being challenged in terms of the inadequacy of manpower, infrastructure, and finance. The study stated that academic libraries should ensure that ICT resources are available and well organized to facilitate easy use by library users. Library services and routines has experienced different shape as a result of integration of ICT in the library (Sarfaraj, & Sangeeta, 2024). The information has become the driving force behind the development of nations and so information professionals should review, adjust and make their skills, technologies, services, and methods up-to-date. Bhoi. (2017) discussed the different aspects of ICTs. It gives an awareness of technology in the library and the reason to understand the use of ICT in the library for rendering enhanced library services and information to users. Complete acceptance and provision of ICT into library services will enhance its productivity. Also, developing countries (like Nigeria) library professionals are expected to be chief facilitators of the process of information storage, packaging and transfer among groups and individuals. Since ICT has come to stay, academic libraries in Nigeria should adopt a positive attitude towards its adoption and adaptation to enhance their service delivery. Access to library resources through the use of Information and Communication Technology (ICT) is needed to enhance equity and inclusivity in literacy, numeracy, and diversity (Fakoyede, Babalola, Ekundayo, & Alabi, 2026).
Development in technology has compelled academic libraries to shift from traditional practices to modern services through the adoption of emerging technologies thereby enhancing academic library services (Faten, Maha, & Hussam, 2024). Oghenovo. There should be proper use of technologies within the services provided by libraries for productive library outputs. (Idhalama, & Nwachukwu, 2025)

(2016) reviewed in his study the availability of information and communication technology in academic libraries in Nigeria, it was shown that academic libraries in Nigeria are at various stages of making ICT available in their libraries though not adequate. He listed some information technology infrastructures found in a study to include:

i. Computers which include a personal computer (PC), laptops that are used to process, organize, store and access information in the library
ii. Printers for printing library documents
iii. Internet for accessing, retrieval of online information, uploading and downloading information
iv. Scanners for the electronic conversion of document
v. Projectors that are used in teaching and learning during presentations
vi. Radio that is used for the recorded audio information
vii. Facsimile for sending and receiving document like book order and quotation
viii. Television sets and video and disc players that are used in viewing audiovisual contents
ix. Slides and film trips that are used in viewing visual contents
x. Telephone for inquiry and services as well as mobile phones
xi. Photocopiers for reprographic services
xii. Videoconferencing and teleconference technologies for online chatting and meetings
xiii. Bulletin boards and electronic notice boards for an announcement like new arrival and other information the library want the public to know.

The benefits accrued to the availability and use of ICT have prompted most academic libraries to provide ICT-based information services to meet the yearning of its users. Such ICT-based information services used in academic libraries are online information services, local and wide area network applications, online journals and databases, library databases, online access catalogues, automated circulation facility and digital online archives (Hussain, & Nazim 2015).

2.3 Academic library

The purpose of academic libraries is to support teaching, learning, and research in higher institutions. Academic libraries are libraries attached to tertiary institutions such as universities, polytechnics, and colleges. They are referred to as the heart, nerve centers or hubs of academic activities aiming at supporting the mission and the vision of their parent institutions which is mainly teaching and research. Academic libraries are expected to be at the forefront of making information services available to their communities which comprises students, lecturers, and researchers (Oghenere, Ezra, & Fhulu 2018). The global trend is now distinguished by a fundamental shift from the traditional information environment to an e-environment where the emphasis is

placed on the acquisition of electronic resources such as e-journals, e-books and online databases (Rexwhite, & Dennis, 2017). The world has become a global village in an information age as a result of the influence of information and communication technology. In this present age of ICT, libraries still carry out their duties and services but in different modes relating to the technological changing needs of their users. Just as ICT is changing the globe, the library profession is not left out.

3.0 Research Methodology

Qualitative research methodology was adopted as the research design for the study. A well-structured questionnaire was used for data collection on questions associated with the ICT infrastructure availability in the selected public University libraries in southwest Nigeria. The questionnaire consisted of Part A and B. Part A contained the demographical data of the respondents, Part B contain items which captured the variables in the study. The questionnaire used a simple descriptive rating scale of Yes/No. A descriptive research method accurately and systematically describes a population, situation or phenomenon (Mccombes, S. 2019). The population of the study comprises 376 library staff (Librarians and Library Officers) of the twelve (12) selected public universities in south-west Nigeria. The population of the library staff is shown in Table 1

Table 1: Population Distribution of academic librarians and library officers (Professionals and Para-professionals) per university library

S/N	Names of the University	Population			University Type
		Academic Librarians	Library Officers	Total	
1	Ekiti State University, Ado-Ekiti (EKSU)	15	26	**41**	State
2	Federal University of Oye Ekiti (FUOYE)	03	14	**17**	Federal
3	Adekunle Ajasin University, Akungba Akoko (AAUA)	06	10	**16**	State
4	Federal University of Technology, Akure (FUTA)	14	11	**25**	Federal
5	University of Osun, Osogbo (UNIOSUN)	05	05	**10**	State
6	Obafemi Awolowo Universty, Ile-Ife (OAU)	24	14	**38**	Federal
7	Ladoke Akintola University of Technology, Ogbomoso (LAUTECH)	18	09	**27**	State
8	University of Ibadan (UI)	26	35	**61**	Federal
9	Lagos State University (LASU)	23	14	**37**	State
10	University of Lagos (UNILAG)	18	16	**34**	Federal
11	Olabisi Onabanjo University, Ago-Iwoye (OOU)	14	18	**32**	State
12	Federal University of Agriculture, Abeokuta (FUNAAB)	25	13	**38**	Federal
		Ground Total		**376**	

Source: From the University Libraries

4.0 Data Analysis and Discussion of Findings

4.1 Distribution of Respondents by Institution Libraries

The total number of 376 respondents were used for the study, and the response rate from each university library was shown in Table 2

Table 2: Distribution of Respondents by Institution Libraries

University Libraries	Number Administered	Number Returned	Cumulative	Percentage (%)
Ekiti State University, Ado-Ekiti (EKSU)	41	30	30	73.2
Federal University of Oye-Ekiti (FUOYE)	17	13	43	76.5
Adekunle Ajasin University, Akungba Akoko (AAUA)	16	11	54	68.8
Federal University of Technology, Akure (FUTA)	25	16	70	64.0
University of Osun, Ososgbo (UNIOSUN)	10	2	72	20.0
Obafemi Awolowo University, Ile-Ife (OAU)	38	23	95	60.5
Ladoke Akintola University of Technology, Ogbomoso (LAUTECH)	27	25	120	92.6
University of Ibadan (UI)	61	38	158	62.3
Lagos State University (LASU)	37	33	191	89.2
University of Lagos (UNILAG)	34	29	220	85.3
Olabisi Onabanjo University, Ago-Iwoye (OOU)	32	18	238	56.3
Federal University of Agriculture, Abeokuta (FUNAAB)	38	27	265	71.4
Total	376	265	265	70.5

4.2 Demographic Data of the Respondents

This section is a portrait of the social-demographic traits of the respondents using frequency and percentage. It shows the distribution of the respondents' variables by institution type. The results were as shown in figure 1.

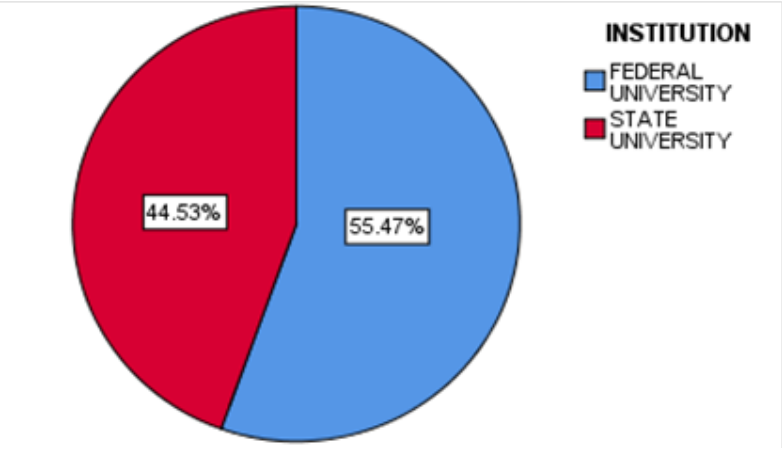


Figure 1: Pie Chart

The institution variable of the respondents in the pie chart showed that majority of the respondents were from federal institutions with 55.5% while respondents from state universities were 44.5%.

5.0 Discussions of Findings

Availability of ICT infrastructures in Academic Library

The objective of the study was "to find out the level of availability of ICT infrastructures in the selected libraries. To examine this objective, dichotomous measurement of "Yes" or "No" was adopted to find out the ICT infrastructures that were available in the various sections of the library such as Technical section, Reference section, Circulation section, Serial section, and ICT unit of both federal and state university libraries. Frequency and percentage count were computed on the data based on institution type. The result was presented in Table

Table 3: Available ICT Infrastructures

Types of Institution	**Federal**		**State**		**Total**	
Available ICT Facilities	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
	F (%)	**F (%)**	**F (%)**	**F (%)**	**F (%)**	**F (%)**
Computer	145(98.6)	2(1.4)	118(100.0)	0(0.0)	263(99.2)	2(0.8)
Printers	136(92.5)	11(7.5)	112(94.9)	6(5.1)	248(93.6)	17((6.4)
Scanning Machine	127(86.4)	20(13.6)	94(79.7)	24(20.3)	221(83.4)	44(16.6)
Television Set	85(57.8)	62(42.2)	92(78.0)	26(22.0)	177(66.8)	88(33.2)
Flash Drives	122(83.0)	25(17.0)	86(72.9)	32(27.1)	208(78.5)	57(21.5)
Modem	56(38.1)	91(61.9)	43(36.4)	75(63.6)	99(37.4)	166(62.6)
Uninterrupted Power Supply (UPS)	94(63.9)	53(36.1)	83(70.3)	35(29.7)	177(66.8)	88(33.2)
Internal OPAC	125(85.0)	22(15.0)	86(72.9)	32(27.1)	211(79.6)	54(20.4)
Radio Phone	54(36.7)	93(63.3)	49(41.5)	69(58.5)	103(38.9)	162(61.1)
Internet	138(93.9)	9(6.1)	104(88.1)	14(11.9)	242(91.3)	23(8.7)
Server	104(20.7)	43(29.3)	68(57.6)	50(42.4)	172(64.9)	93(35.1)
Photocopy Machine	69(46.9)	78(53.1)	66(55.9)	52(44.1)	135(50.9)	130(49.1)
E-mail	95(64.6)	52(35.4)	77(65.3)	41(34.7)	172(64.9)	93(35.1)
Power Generator	61(41.5)	86(58.5)	80(67.8)	38(32.2)	141(53.2)	124(46.8)
Library Software	88(59.9)	59(40.1)	65(55.1)	53(44.9)	153(57.7)	112(42.3)
CCTV Camera	30(20.4)	117(79.6)	50(42.4)	68(57.6)	80(30.2)	185(69.8)
LCD/Overhead Projector	42(28.6)	105(71.4)	47(39.8)	71(60.2)	89(33.6)	176(66.4)
Digital Camera	41(27.9)	106(72.1)	33(28.0)	85(72.0)	74(27.9)	191(72.1)
Fax Machines	29(19.7)	118(80.3)	17(14.4)	101(85.6)	46(17.4)	219(82.6)
CD/DVD Player	39(26.5)	108(73.5)	36(30.5)	82(69.5)	75(28.3)	190(71.7)
Multimedia Projector	45(30.6)	102(69.4)	42(35.6)	76(64.4)	87(32.8)	178(67.2)
USB Pen Drives	40(27.2)	107(72.8)	29(24.6)	89(75.4)	69(26.0)	196(74.0)
Electronic Database	85(57.8)	62(42.2)	59(50.0)	59(50.0)	144(54.3)	121(45.7)
Library Website	92(62.6)	55(37.4)	62(52.5)	56(47.5)	154(58.1)	111(41.9)

Types of Institution	Federal		State		Total	
Available ICT Facilities	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
	F (%)	**F (%)**	**F (%)**	**F (%)**	**F (%)**	**F (%)**
Web OPAC	93(63.3)	54(38.1)	45(38.1)	72(61.0)	138(52.1)	126(47.9)
Wide Area Network (WAN) i.e WIFI	113(76.9)	34(23.1)	55(46.6)	63(53.4)	168(63.4)	97(36.6)
CD-ROMs	93(63.3)	54(36.7)	53(44.9)	65(55.1)	146(55.1)	119(44.9)
Local Area Network (LAN)	92(62.6)	55(37.4)	54(45.8)	64(54.2)	146(55.1)	119(44.9)
Electronic White Board	68(46.3)	79(53.7)	40(33.9)	78(66.1)	108(40.8)	157(59.2)
E-Journal	111(75.5)	36(24.5)	66(55.9)	52(44.1)	177(66.8)	88(33.2)

Source: Field Study

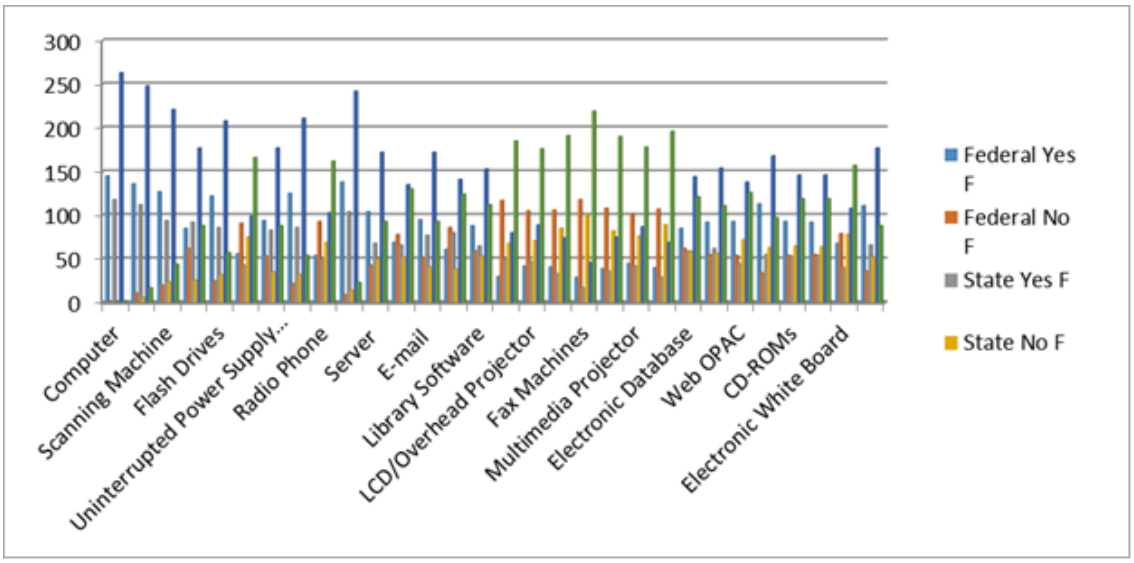


Figure 2: Graph Showing the Available ICT Infrastructure

Table 3 showed the frequency and percentage of the available ICT infrastructures in both federal and state libraries of the selected Public Universities in South-West, Nigeria. The result showed that Information and Communication Technology (ICT) infrastructures were available in the state and federal institutions respectively. Availability of computer infrastructure is slightly higher in state institutions with (100.0%) than federal institutions with (98.6%). Printer facilities were also more available in state institutions with (94.9%) than federal institutions with (92.5%). Scanning machines were more available in federal institutions with (86.4%) than state institutions with (79.7%). State institutions have more television sets with (78.0%) than federal institutions with (57.8%). Flash drives were more available in federal institutions with (83.0%) than state institutions with (72.9%). Availability of Uninterrupted Power Supply (UPS) is higher in state institutions with (70.3%) than federal institution with (63.9%). Internal OPAC were more available in federal institution with (85.0%) than state institution with (73.9%). Internet facilities were available in federal institutions with (93.9%) and state institutions with (88.1%). Server facilities were more available in federal institutions with (70.7%) than state institutions with (57.6%). Photocopy machines were more available in state institutions with (55.9%) than federal institutions with (46.9%). E-mail facilities were also more available in state institutions with (65.3%) than federal institutions with (64.6%). State institutions have more power generator facilities with (67.8%) than federal institutions with (41.5%). Library software facilities were more available in federal institutions with (59.9%) than state institutions with (55.1%). Electronic Database facilities were more available in

federal institutions with (57.8%) than state institutions with (50.0%). Library Website facilities were also more available in federal institutions with (62.6%) than state institutions with (52.5%). Web OPAC facilities were available in federal institutions with (63.3%) and state institutions with (38.1%). Wide Area Network (WAN) i.e WIFI facility recorded more availability in federal institutions with (76.9%) and lesser availability in state institutions with (46.6%). CD-ROMs facilities were more available in federal institutions with (63.3%) than state institutions with (44.9%). Local Area Network (LAN) facilities were more available in federal institutions with (62.6%) than state institutions with (45.8%). E-Journal facilities were more available in federal institutions with (75.5%) while state institutions recorded (55.9%).

Modem facility recorded lesser availability in federal institutions with (38.1%) as well in state institutions with (36.4%). Radio phones were also available in state institutions with (41.5%) and federal institutions with (36.7%). CCTV camera facilities were not so much available in state institutions with (42.4%), but still higher than federal institutions with (20.4%). LCD/Overhead Projectors were also less available in state institutions with (39.8%) and federal institutions with (28.6%). Digital Camera recorded low availability in state institutions with (28.0%), but higher than federal institutions with (27.9%). Fax machines facilities were not that available in federal institutions with (19.7%), but still higher than state institutions with (14.4%). CD/DVD Player facility also recorded low availability in state institutions with (30.5%) and federal institutions with (26.5%). Multimedia Projector facilities were less available in state institutions with (35.6%) and federal institutions with (30.6%). USB Pen Drives facilities were also less available in federal institutions with (27.2%) and state institutions with (24.6%). Electronic White Board facilities were less available in federal institutions with (46.3%) and state institutions with (33.9%). This finding corroborates Oghenevo, (2016) that academic libraries in Nigeria are at various levels/stages of making ICT infrastructures available in their libraries even though not up to expectation. Summarily, some of the ICT infrastructures were more available in state institutions' libraries than federal institutions' libraries such as Computer facility, Printers, Television set, Uninterrupted Power Supply (UPS), Photocopy Machine, E-mail facility, Power Generator facility, Radio Phone, CCTV camera, LCD/Overhead Projector, Digital Camera, CD/DVD, and Multimedia Projector facility, while the following ICT facilities were more available in federal institutions' libraries than state institutions' libraries: Scanning Machines, Flash Drive, Internal OPAC, Internet facility, Server facility, Library Software, Electronic Database, Library Website, Web OPAC, Wide Area Network (WAN), CD-ROMs, Local Area Network (LAN), E-journal, Modem, Fax Machines, USB Pen Drive, and Electronic White Board.

6.0 Conclusion

This study assessed the level of availability of ICT infrastructures in some selected public universities in southwest Nigeria. It was observed from the study that ICT infrastructures were available in all the selected libraries, but the level of availability of the majority of ICT infrastructures were very low except for ICT facilities such as computer, internet facility, printers, e-mails, and scanning machines. ICT infrastructures in the libraries under investigation could not be compared with what is obtainable in the developed countries' university libraries in spite its benefits in academic libraries at present. This is in line with Rafique, Subhpoto, & Idrees. (2023) which opined that many libraries in interior Sindh were not having enough ICT infrastructure, software, and digital library resources

7.0 Recommendation

Based on the findings and conclusion of this study, It was recommended that academic libraries in Nigeria should try and bridge the gap observed by making ICT infrastructures available for improved library services.

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