



CLOUD COMPUTING TECHNOLOGIES FOR EFFECTIVE SERVICE DELIVERY IN FEDERAL AND PRIVATE UNIVERSITY LIBRARIES IN NORTH CENTRAL NIGERIA

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Abstract

The study investigated Cloud Computing Technologies for effective Service Delivery in Federal and Private University Libraries in North Central Nigeria. Three specific objectives guided the study. Descriptive survey design was adopted. A total of 191 librarians and IT staff which comprises of 178 librarians and 13 IT staff. Questionnaires (CCTQ) and observation checklist (CCTOC) were used for data collection and were validated by three experts. Instrument's reliability shows an overall correlation of 0.97. 178 librarians and IT staff were used for this study representing the 100% return rate. Data collected was analysed using frequency count, percentage and means, standard deviation to answer the research questions. Also, real limit of numbers was used in taking decisions. Results of the study showed that ICT facilities are available in Federal and Private University. Libraries need to acquire current and new ICT facilities for providing effective service. Incompetence of librarians in applying computer for library activities cripples effective service delivery. Based on the findings the study recommended librarians and IT staff would have to engage on a regular training on new and emerging technology as well as acquire more skills, and leverage on cloud to reduce cost of maintaining hardware. Also, the provision of adequate funding for libraries to acquire more advance and adequate ICT facilities as it emerges that would enhance effective service delivery by librarians and IT staff.

Keywords: *University Libraries, Cloud Computing, Technology, Effective Services and Service Delivery*

Introduction

University Libraries like all other libraries in human history are facing fundamental redefinition of their work processes including service delivery methodologies as a result of advances in digital technology. It has been observed that hi-tech information systems have pervasively influenced all spheres of human endeavours and seems to control the present dispensation and potentially, shape the future events. Furthermore, their impacts on libraries and documentation centres can no longer be ignored (Omekwu 2020). University Libraries have the responsibility of selecting, acquiring and organizing relevant information materials that will effectively assist teaching, learning, research and recreational activities and as well contribute

immensely to knowledge generation and cater for large number of knowledge seekers. (Ishola & Obadere, 2014; Nnadozie & Onah 2016 cited in Dika, 2019).

University Libraries are equipped with various types of information resources that include print and non-print hard and soft copies such as journals, books, serials, reference resources etc. that are made possible with emerging technologies in libraries. These resources are provided through a wide range of services such as Selective Dissemination of Information (SDI) services, reference services, charging and discharging of library materials, Current Awareness Services (CAS), photocopying, provision of reading materials and reading space, inter library loan and user education programs, shelf management, operation of the Online Public Access Catalogue (OPAC), book exhibitions, displays, references enquiry services, online and internet services, bibliographic services, etc. aimed at helping the university meet its goals and objectives (Nwali, 2010; Popoola & Haliso as cited in Dika 2019; Uganneya, 2011). Oloaku, (2017) stressed that internet services applied for delivery of library services include: e-mail, chat groups, file Transfer Protocol, chat and instant messaging and World Wide Web. Hence, library services in the current digital age are based on cloud technology.

Some of the commonly used cloud computing technology applications are: Web mails applications such as (Gmail, Yahooemail, Sifymail), online storage systems such as (Skydrive, Idrive, Box.net), Web-based office tools such as (Google Docs & Zoho), web-based RSS readers such as (Bloglines, Google Reader), entertainment applications such as (YouTube, Hulu), Social networking (Orkut, Facebook, hi5) and Web based useful applications: P&O (sharing large files), Adobe Photoshop Express (online photo editors), Jumpcut (edit videos online). All these activities are performed in cloud accessible environments through any device having web browser with internet connection (Jaatmaa, 2010; Sriram & Khajeh-Hosseini, 2010, Taleb & Mohamed; 2020 and Hassan, A. S. et Al 2022).

Statement of the Problem

University Libraries render different kinds of services such as charging and discharging of information resources to users, reference services, inter-library loan and others. Most of these services are rendered manually by the traditional method which has become out of trend, time consuming and unsatisfactory. Traditional library method of service delivery limit access to library resources and library services 24/7 in any giving library. This condition can be enhanced upon by cloud computing technology applications which creates an enabling environment for library resources to be accessed without physical presence and allows opportunities for its coverage and larger audiences and uses without barriers or hitches of time and geography. Therefore, many University Libraries are now realigning their services to meet the demands of users query and to bring their services even more closely to their users and abide by current trends if they must continue to remain relevant and be a pacesetter in present day information age. However, the demands for innovative library service delivery need to be enhanced therefore librarians and IT staff need to be empowered and equipped with needed skills for efficient and effective service delivery. Similarly, there seems to be few empirical studies that have focused or

treated on cloud computing technology application for effective library services delivery in Nigeria. Therefore, this is the problem that this study seeks to fill the gap and provide more insight on the application of cloud computing technology for effective library service delivery in Federal and Private University Libraries of North Central, Nigeria.

Objective of the study

The following specific purposes guided the study to:

1. Identify the ICT facilities available for the application of cloud computing technologies for effective service delivery in Federal and Private University Libraries of North Central, Nigeria;
2. Ascertain the extent of application of cloud computing technology for effective services delivery in Federal and Private University Libraries of North Central, Nigeria;
3. Ascertain the library services that require cloud application for effective services delivery in Federal and Private University Libraries of North Central, Nigeria.

Literature Review

Cloud is a new phenomenon that is applied in library services for better performance and to enhance service delivery. Thus, libraries apply various cloud services in carrying out her day to day activities such as e-books lending services, union shared/ catalogues (OPAC), documents download, digital preservation/ scanning services, article delivery services, current awareness services, bulletin board services, info- common, file sharing, e-learning, information literacy orientation, social interactions with users amongst others. Cloud library services are meters that integrate telemetry as a part of service offerings; CAS and SDI services through emails, RSS feeds or web feeds, Social networking websites and blogs; cloud based self-service for real time queries; Global Cooperation in maintaining bibliographic and authority records; Global collaboration on decision of collection development, preservation and digitization; Collaborative management of cloud resources (Uganneya, 2011; Straus, 2012).

Libraries of all kinds will have to muddle through with similar issues as cloud computing grows to become the dominant way through which new technology services are applied for effective services delivery. OCLC is considered as one of the best examples for using cloud computing for sharing libraries data for years (Kaushik and Kumar, 2013). These authors stressed that OCLC offers various services pertaining to circulation, cataloguing, acquisition and other library related services on cloud platform through the web share management system. Cloud computing provides an integrated library resources (Kumar et al 2012). Libraries are shifting their services to cloud and networking with the facilities to access these services anywhere and anytime. According to Okwoli (2012) Kaushik & Kumar (2013) cited in Dhanevandin and Tamizcheven, (2014), the cloud computing technology can be deployed in the following areas in university libraries: Building Digital Library/Repositories, File Storage and Searching Library Data. Furthermore, Yang (2012), also noted areas such as Searching Scholarly Content, Building Community

Power and Website Hosting. Today, many software vendors like Ex-Libris, OSS Labs are offering this service on the cloud and third party services offering hosting of this service such as SaaS approach on the cloud to save libraries from investing in hardware for this purpose. Apart from cost-benefit, the libraries will be free from bearing maintenance costs viz. software updates, backup, thereby boosting her services (Dhanevendan et al, 2014).

Cloud computing which is an online or web data driven system thrives base on the availability of necessary ICT Facilities more particularly in the area of its application in the management of library resources and services in academic libraries as revealed by some empirical studies. They noted that as the use of ICT has permeated the lives of every individuals, library patrons are now getting dissatisfied with the traditional services and resources of libraries., Nkamneb, and Nkamnebe (2014) conducted a study on the evaluation of the use of university library resources and services by the students of Paul University, Awka, Anambra State, Nigeria., with six objectives and research questions to guide the study, they adopted descriptive survey research design with 276 student comprising of 100 level - 400 level students were randomly selected for the study. The instruments used are structured questionnaire and observation as instruments for data collection. Hence, descriptive statistics was used to analyse the data obtained. The findings of their study showed that most of the students were partially dissatisfied with the services and facilities of the libraries. The study is different from the current study in scope, geographical coverage, number of objective that guided the study and the population, sample size larger than the current study but both study a similar in term of services and facilities and the method of data analysis are same.

The application of Cloud Computing Technology is one of the recent technological development in libraries. Yuvaraj, (2013) conducted a study on cloud computing application in Indian central university libraries. The research was guided by four (4) major objectives and research questions were formulated for the study. 29 out of 41 central universities in India were considered for the study. Hence, survey method was used for the administration of questionnaire for data for the study. A purposive sampling of 488 library professionals drawn from a countrywide population of 29 central university libraries in India was done for the study. A 26-item structured questionnaire with open and closed ended question designed to query their experience on the use of cloud computing applications and was sent via e-mail over a period of eleven (11) months; soft-copies of the questionnaires was also available for completion upon request. The data were analysed adopting descriptive statistics using Statistical Package for Social Science (SPSS). The findings of the study showed that all levels of staff members are part of the implementation and usage of cloud technology with heavy domination of middle level staff.

Guchacha, (2019) conducted a study on integration of cloud computing and service delivery in academic libraries with reference to South Eastern Kenya University, the study was guided by four objectives and research questions respectively. It adopted both quantitative and qualitative research approaches. In total 152 respondents were included in the study where 63 and 89 were lecturers and postgraduates' students. Purposive and census sampling techniques were adopted in



selecting the respondents for data collections, as data and information was collected through questionnaires and document analysis and thematic content analysis methods. The results revealed that cloud technologies have greatly influence service delivery in academic libraries in addition has led to introduction of new services. Use of cloud computing in libraries has tremendous benefits to users as it enables access to services anywhere and anytime there are challenges related to inadequate computing facilities. The study under review is closely related as both study seeks to address the use of cloud for services delivery in higher institution libraries but the study is restricted to the review of reference unit where the present study look at all other division of the library holistically.

Mohammed, (2015) conducted a research on cloud adoption in Africa: the case of Nigeria. The purpose of the study was to understand the thought of 17 professionals and decision makers about cloud computing. It tried to draw upon the contexts of existing literature and previous research in order to explore the factors that influence the adoption of cloud computing in Nigeria. The research was guided by four (4) research questions. Qualitative and quantitative approaches were adopted for the study. A population of 109 participants were surveyed online for a period of three weeks (3) using Google Doc form. The 109 questionnaires were sent via email and they received 41.3% response rate form IT professionals working either in IT firm, employed in IT department of organization or are actually involved in research or graduate study in IT mostly from the universities in Nigeria. The result shows that cloud adoption for organization and government agencies in developing countries poses a major challenge, given that it is a recent technology still under development. Though it receives a considerable attention of researchers in industrialized countries, its understanding and recognition is quite low among IT professionals in developing countries. This eventually would lead organizations and government agencies not to explore its full benefits. It equally revealed that cloud application is only foreseeable in the future. It pointed out that efforts are required from both government and IT service providers to overcome the obstacles of its adoption.

Methodology

The study adopted descriptive survey design. The population of the study is 191. Comprised of 178 Librarians and 13 Information Technologists (IT) staff from Federal and Private University Libraries in North Central, Nigeria. No sampling technique was used for the study, due to the manageable size. The entire populations of 178 respondents were used for the study representing a response rate of 100%. This was conveniently handle by the researcher, two research instruments were used for data collection, observation checklist and questionnaire titled "Cloud Computing Technologies for effective Service Delivery in Federal and Private University Libraries in North Central Nigeria" (CCTQ) and (CCTOC) were vetted taking into consideration the purposes and research questions. The questionnaire was administered by the researcher with the help of research assistants from each of the University Libraries under study. The distribution and collection of the instrument lasted for a period of three weeks. The researcher used observation checklist to physically check the availability of facilities. The data collected from this study were analysed using both

frequency count and percentages. Descriptive statistics was used to analyse data for research questions.

Results

Research Question One: What are the ICT facilities available for cloud computing technology in Federal and Private University Libraries of North Central, Nigeria?

Table 1: ICT Facilities Available for cloud computing technology in Federal and Private University Libraries in North Central, Nigeria (CCTOC) Observation Checklist

S/N	FACILITIES	FUL	UNIJ	UNABJ	FUTM	FUAM	UNIL	FULA	SU	BU	AL-HU	AVF	ANF	NA	D
1.	Local Area Network (LAN)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	0
2.	Computer Area Network (CAN)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
3.	Wide Area Network (WAN)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
4.	Storage Area Network (SAN)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
5.	Network	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
6.	Personal Area Network (PAN)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
7.	Virtual Private Network (VPN)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
8.	Enterprise Private Network	X	X	X	X	X	X	X	X	X	X	0(0%)	0(0%)	10(100%)	NA
9.	Metropolitan Area Network (MAN)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
10.	Internet Service	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
11.	Desktops	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
12.	Laptops	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
13.	Palmtops	X	X	X	X	X	X	X	X	X	X	0(0%)	0(0%)	10(100%)	NA
14.	I pad	X	X	X	X	X	X	X	X	X	X	0(0%)	0(0%)	10(100%)	NA
15.	Notebooks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
16.	Tablets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
17.	Radio Frequency	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
18.	Printers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
19.	USB stick	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
20.	Keyboard	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
21.	Mouse	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
22.	I Phone	X	X	X	X	X	X	X	X	X	X	0(0%)	0(0%)	10(100%)	NA
23.	Modem	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
24.	Scanners	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
25.	Projector	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
26.	Land phones	✓	X	X	X	X	X	X	X	X	X	1(0%)	0(0%)	9(90%)	NA
27.	Mobile /Smart phones	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
28.	CD/ DVD drives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
29.	Media USB/HD cable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF
30.	Flash drive	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10(100%)	0(0%)	0(0%)	AVF



S/N	FACILITIES	FUL	UNIJ	UNABJ	FUTM	FUAM	UNIL	FULA	SU	BU	AL-HU	AVF	ANF	NA	D
31	Memory card	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
32	Micro film	X	X	√	√	√	√	X	X	X	X	4(40%)	0(0%)	6(60%)	NA
33	Infrastructure as a Service (IaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
34	Software as a Service (SaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
35	Platform as a Service (PaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
36	Application as a Services (AaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
37	Storage as a services (StaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
38	Desktop as a service (DaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
39	Test environment as a service (TEaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
40	Monitor as a service (MaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
41	Security as a services (SECaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
42.	Communication as a service (Ca3GaaS)	√	√	√	√	√	√	√	√	√	√	10(100%)	0(0%)	0(0%)	AVF
	AVF	37(88.1%)	36(85.7%)	37(88.1%)	37(88.1%)	37(88.1%)	36(85.7%)	36(85.7%)	36(85.7%)	36(85.7%)	36(85.7%)				
	ANF	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)				
	NA	5(11.9%)	6(14.3%)	5(11.9%)	5(11.9%)	5(11.9%)	6(14.3%)	6(14.3%)	6(14.3%)	6(14.3%)	6(14.3%)				

FUL= Federal University Lokoja; UNIJ= University of Jos; UNABJ= University of Abuja; FUTM= Federal University of Technology Minna; FUAM=Federal University of Agriculture Makurdi; UNIL= University of Ilorin; FULA= Federal University Lafia; SU= Salem University; BU= Base University; AL-HU= Al-Hikimah University; √= Available and Functioning; x= Available and not functioning; z= Not Available

Table 1 showed the results of the checklist on ICT facilities available in University Libraries in North Central, Nigeria. (CCTOC) The available tools from the observation checklist are the following Local Area Network (LAN), Computer Area, Network (CAN), Wide Area Network (WAN), Storage Area Network (SAN), Network, Personal Area Network (PAN), Virtual Private Network (VPN), Internet Service, Desktops, and Laptops among others. The researcher observed that 9 out of the 10 university libraries have no land phone except 1 Federal University Lokoja.

Research Question Two

What is the extent of cloud computing technology for effective services delivery in Federal and Private University Libraries of North Central, Nigeria?

Table 2: Mean rating of respondents on the extent of cloud computing technology for effective services delivery in Federal and Private University Libraries of North Central, Nigeria (CCTQ)

	Extent of Application	Mean	SD	D
A	Acquisition	2.64	.192	HE
1.	Online Selection	2.80	.972	HE
2..	Online exhibition	2.46	1.08	LE
3.	Online publishing	2.38	1.00	LE
4.	Online marketing	2.35	.999	LE
5.	Online purchase of E-books	2.76	1.00	HE
6.	Online purchase of E-journal	2.83	.938	HE
7.	Online purchase of database	2.78	.963	HE
8.	Online purchase of E-catalogue	2.76	1.02	HE
9.	Online Order	2.63	1.03	HE
B.	Organization of Knowledge and Resources	3.06	.131	HE
10.	KOHA Open Source Integrated Library System	3.18	.965	HE
11.	OPAC	3.20	.956	HE
12.	Library of Congress Online Catalog	3.06	.938	HE
13.	OCLC	2.89	.994	HE
14.	Evergreen Software	2.98	1.00	HE
C	References and Information Services	2.66	1.11	HE
15.	E-dictionary	2.89	.950	HE
16.	Short Message services (SMS)	2.64	1.01	HE
17.	E-encyclopaedias	2.68	.979	HE
18.	Instant Messaging	2.55	.946	HE
19.	Really Simple Syndication (RSS)	2.53	.979	HE
20.	Current Awareness services	2.67	.907	HE
21.	Selective Dissemination of Information	2.63	.923	HE
22.	Online referral service	2.72	1.00	HE
D.	Circulation	2.58	.783	HE
23.	Integrated Library System (IIS)	2.82	.965	HE
24.	OpenBiblio	2.63	1.00	HE
25.	Online Library Registration	2.86	1.08	HE
26.	Cloud based library reservation	2.48	1.06	LE
27.	Student Registrations Portal	2.89	.986	HE
28.	Current Awareness Services (CAS)	2.84	1.02	HE
29.	Selective Dissemination of Information (SDI)	2.72	1.00	HE
30.	Online eBook reservation	2.50	1.01	HE
31.	Inter- Library Loan services (ILS)	2.37	1.02	LE
32.	Social Network Service (SNS)	2.53	.955	HE
33.	Online book lending	2.31	.952	HE
34.	Online place on Hold	2.32	1.01	LE
35.	Online Marketing	2.38	1.04	LE
36.	Online overdue fine Charges	2.50	1.06	HE



	Extent of Application	Mean	SD	D
D.	Serials Control	2.67	1,12	HE
37.	E- Thesis	2.66	.983	HE
38.	E- Journal	2.76	.918	HE
39.	E- Textbooks	2.85	.957	HE
40.	E-Dictionaries	2.71	1.00	HE
41.	E-encyclopaedia	2.71	.965	HE
42.	Cloud Based Serial	2.47	.939	LE
43.	E-Newspaper	2.59	1.04	HE
44.	E-Bulletin	2.50	1.00	HE
45.	E-Journal	2.70	1.02	HE
46.	Database	2.76	1.02	HE
E	E-Library Service	2.73	.521	HE
47.	YouTube	2.60	.974	HE
48.	Skyp Video	2.55	1.06	HE
49.	IMO Video	2.31	1.02	LE
50.	Whatsapp Video	2.49	1.10	LE
51.	Vimeo	2.48	1.10	HE
52.	Instagram Video	2.43	1.10	LE
53.	Screen Cast	2.40	1.12	LE
54.	Google Presentation	2.47	1.16	LE
55.	Tele conferencing	2.59	1.12	HE
56.	Scanning images with scanner	2.74	1.16	HE
57.	Download PDF document	2.94	1.06	HE
58.	Ability accessing full text e-resources	3.09	1.03	HE
59.	Locating e-resources with search engines	3.12	.985	HE
60.	Ability to attach file messages to an email	3.18	.881	HE
61.	Ability to access information on the internet	3.05	.999	HE
62.	Ability to combine Boolean operators for search	3.01	.973	HE
63.	Ability to post and share file	2.97	.944	HE
F	Library Administration	2.41	.544	LE
64.	E- Transcript	2.40	1.09	LE
65.	Cloud based online library notification of job creation	2.15	1.02	LE
66.	Cloud Based Electronic Newsletter	2.31	.937	LE
67.	Electronic Email	2.81	1.08	HE

Keys: Very High Extent [VHE] High Extent [HE] Low Extent [LE] Very Low Extent [VLE]

Table 2 showed the extent of application of cloud computing for effective service delivery in Federal and Private University Libraries of North Central, Nigeria. The analysis revealed that acquisition (mean=2.64); were applied to a high extent. Mean scores of item under this section ranges from 2.36 – 2.83. They include online selection (mean=2.80); online exhibition (mean=2.46); online publishing (mean=2.38); online marketing (mean=2.35); online purchase of E-books (mean=2.76); amongst others are all provided. Under organization of knowledge and

resources (mean=3.10), they include KOHA Open Source Integrated Library System (mean=3.18); OPAC (mean=3.20); Library of Congress Online Catalog (mean=3.06) and OCLC (mean=2.89) all provided. Under organization of knowledge and resources (mean=2.94) and Classification of all library materials (mean=3.01) are provided. In References and Information Services (mean=2.66) are provided. Among *Circulation* (mean=2.58), Integrated Library System (IIS) (mean=2.82); Open Biblio (mean=2.63) and online library registration (mean=2.86) among other were provided. E- *Serial control* (mean=2.67), E-thesis (mean=2.66); E-journal (mean=2.76); E- textbooks (mean=2.85); were provided. Finally, in library administration (mean=2.41) is applied in low extent, also all the items except Electronic Email (mean=2.81) were not provided. Also, the researcher observed that services like online book lending, online place on hold, online marketing, WhatsApp video, e- transcript amongst others are applied in low extent applied by federal and private University Libraries of North Central, Nigeria.

Research Question Three

What are the library services that require cloud computing technology for effective service delivery in Federal and Private University Libraries of North Central, Nigeria?

Table 3: Library services that require cloud computing technology for effective services delivery in Federal and Private University Libraries of North Central, Nigeria.

	Library service that require	Mean	SD	R	D
1.	Electronic Mail	3.49	.695	1 st	A
2.	Current Awareness Services (CAS)	3.38	.827	2 nd	A
3.	Online file sharing	3.37	.727	3 rd	A
4.	Online library Registration	3.37	.844	4 th	A
5.	Selective Dissemination of Information (SDI)	3.35	.764	5 th	A
6.	Online Cataloguing Services	3.35	.831	5 th	A
7.	Digital Preservation	3.26	.847	7 th	A
8.	Short Message Services (SMS)	3.25	.862	8 th	A
9.	Online research	3.25	.758	8 th	A
10.	Social network service	3.23	.920	10 th	A
11.	OPACs and tags	3.22	.871	11 th	A
12.	Instant messaging	3.18	.849	12 th	A
13.	Online selection and acquisition	3.16	.918	13 th	A
14.	Online marketing	3.13	.980	14 th	A
15.	Library Instruction / Information literacy	3.12	.912	15 th	A
16.	Online library tutorial	3.11	.950	16 th	A
17.	Electronic newsletter	3.10	.960	17 th	A
18.	Serial	3.10	.976	17 th	A
19.	Online publishing	3.07	.879	19 th	A
20.	Online library orientation	3.02	.956	20 th	A
21.	Online Tele conferencing	2.97	1.022	21 st	A
22.	Online library notification of job creation	2.95	.991	22 nd	A
23.	Weblog	2.95	1.022	22 nd	A
24.	Information common	2.92	1.031	24 th	A

	Library service that require	Mean	SD	R	D
25	Online Library reservation	2.91	1.126	25 th	A
26	Course reservation	2.89	1.025	26 th	A
27	Inter- Library loan Services	2.89	.998	26 th	A
28	Really Simple Syndication (RSS)	2.87	.995	28 th	A
29	Online library exhibition	2.87	1.018	28 th	A
	Cluster Mean	3.12	.857		A

Keys: Strongly Agreed [SA], Agreed [A], Disagreed [D] Strongly Disagreed [SD]

Table 3 revealed that, the mean ratings of the responses of the respondents on the library services that require cloud computing technology for effective service delivery had mean values ranging from 3.10 to 3.38 which are all above the cut-off point of 2.50 on a 4-point rating scale. The response of the respondents agreed to all the items on library services that requires cloud computing technology application as applicable with mean values ranging from 3.38 to 3.10 includes Current Awareness Services (CAS) (X=3.38); Selective Dissemination of Information (SDI) (X=3.35); Digital Preservation (X=3.26) amongst others are ranked highest.

Discussion of Findings

The findings of the study revealed that most of the items listed which includes Local Area Network (LAN), Computer Area Network (CAN), Wide Area Network (WAN), Internet services, laptops and desktops, scanners, storage networks among others are available in University Libraries in North Central, Nigeria. While enterprise private network, palmtops, Ipad, and Iphone are not available in all 10 university libraries and with exception of Federal University Lokoja (FUL) that has land phone. This is to confirm the statements of Oloaku, (2017) who stressed that computer/hand held devices and internet services are applied for delivery of library services such as e-mail, chat groups, file Transfer Protocol, chat and instant messaging and World Wide Web. Hence, library services in the current digital age are based on cloud technology and the use of ICT facilities.

The findings of this study revealed that cloud computing are applied to a large extent by Librarians and IT staff in North Central, Nigeria for effective services delivery in areas such as: acquisition, organization of knowledge and resources, reference and information service, circulation, serial control E-library service and library administration. To buttress this findings Kaushik & Kumar (2013) identified OCLC as one of the best examples for using cloud computing for sharing libraries data over the years; pointed out that OCLC as cloud provides various services such as circulation, cataloguing, acquisition and other library related services on cloud platform like the web share management system which facilitates an open and collaborative platform that allows each library to share their resources, services, ideas, and problems with the library community on the cloud. The result of the findings shows that email services, Current Awareness Services (CAS), Selective Dissemination of Information (SDI), Digital Preservation, Online file sharing, Online Cataloguing services/OPAC and Social network services ranked the highest among the services that cloud computing is applied. This is in support of Saikia and Goahain (2013), Adebayo and Oyejoke, (2016) and Kona, Chagari and Rudraksh, (2016) who

all emphasized and identified that university libraries are known to apply cloud services ranging from access to library collections through the OPAC; delivery of services, documents as utility; just-in-time during need on demand library services; cloud based recommended system to make user friendly retrieval strategy, borrowing/loaning of materials, Current Awareness Services (CAS), Selective Dissemination of Information Services (SDI), and references services as services which offers wide range of information resources to attend to the information needs of users. This collaborate the submission of Luo (2013), that cloud used by reference Librarians of US apply cloud for collaboration work and internal communication support information literacy. In another view Akin, Temilayo and Daramola (2014), states that seven universities apply Google Docs Modules, Google mail, Yahoo mail among others.

Conclusion

Technology is the steering on which the world rides, it permeates every aspect of human endeavours including the Library and Information profession hence, making librarians and IT professionals more relevant in the profession thereby, forcing them to continuously embrace technologies and be proactive in updating their ICT skills so as to remain trendy and competent in the delivery of library and information services to varying users. The findings of this study has proved that majority of the facilities necessary for cloud computing services such as Local Area Network (LAN), Computer Area Network (CAN), Wide Area Network (WAN), Internet services, laptops and desktops, scanners, storage networks among others are available in majority of the University Libraries in North Central, Nigeria and are functional. Hence, the University Libraries in the area of study adopts cloud technology for effective service delivery to a great extent in services such as email services, Current Awareness Services (CAS), Selective Dissemination of Information (SDI), Digital Preservation, Online file sharing, Online Cataloguing services/OPAC and Social network services. While some areas like acquisition, online exhibition, online publishing, and online marketing. Circulation: inter-library loan services (ILS), cloud based library reservation, etc. are yet to be on cloud services.

Recommendations

Considering the findings and implications of the study, the following recommendations are made:

1. University Libraries funding should be increased to enable it upgrade to modern ICT infrastructures to aid them in providing effective service that meet the societal information growing needs.
2. University Libraries should improve their bandwidth subscription of internet-connectivity to enhance effective and quality service delivery on cloud.
3. Librarians and IT staff need to be proactive by empowering themselves to meet up with the challenges of modern library design and demand respectively.
4. University Libraries should be provided with robust internet facilities to assist them in delivering quality and effective services.

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