



Save in Cloud, Access Anywhere: The Utilization of Cloud Computing in University Libraries for Library Service Delivery in Contemporary Age

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Abstract. Clouds computing as become a cornerstone of modern technology, allowing one to save data on remote servers, accessible from any device with an internet connection. This accessibility fosters inclusivity and expands the reach of library services beyond traditional boundaries. Thus, this study focused on the research “Save it on the cloud and access anywhere: the utilization of cloud computing in university libraries for Library Service Delivery in contemporary age” The multi-stage sampling procedure was used to select the sample for this study. First stage involved stratifying the Universities on the bases of geopolitical zones. Second stage, the Universities in the six states were further grouped according to Federal, State and Private. T18 Universities comprising Federal, State and Private. Final stage involved the use of purposive sampling of total population to draw respondents. An online Google form questionnaire was used for this study and was distributed to respondents through Nigerian Library Association state chapters’ online platforms. 157 questionnaire were sent back but 148 respondents accurately filled the form correctly, and as such were considered valid for analysis. Frequency simple percentage and Mean scores were used to analyze the received responses. Result of the analysis show that cloud computing technologies were utilized to a high extent. The challenges affecting utilization of cloud computing technology were Limited staff training on cloud technology usage, and Compatibility issues with existing systems impede integration. The possible strategies for enhancing utilization of cloud computing technology were allocating dedicated budget for cloud technology investments and implementing robust data security measures for cloud solutions. The study suggested, among other things that University library management should increase the training sessions or

resources to help librarians know the importance of cloud computing technology and There’s need for collaboration between librarians, IT staff, University management and other stakeholder to ensure that infrastructure that will enhance the implementation of cloud computing technology in university libraries for library service delivery.

Keywords: cloud computing, storage, accessibility, service delivery, contemporary age, university

1. Introduction

The aim of university libraries is to provide access to information resources in both print and non-print formats. Balancing access and security in libraries is a difficult but a necessary task. A number of studies have described how crimes and security breaches incidences can affect the provision of library services to users. Holt (2018) identified several such incidents, (i) theft of physical materials; (ii) theft or alteration of data; and (iii) theft of money as major security crime in libraries. Other forms of breaches include non-return of items by borrowers, theft of library equipment, personal theft (from staff and users), verbal and physical abuse against staff and users, and vandalism against library buildings, equipment and stock destruction, all of which can directly or indirectly affects the provision of library services (Opara 2022). Similarly, Lorenzen (2018) reported how different forms of collection mutilation such as underlining and highlighting text in library books, tearing and or removing pages of books and annotating in books margins can temper with the subject-content of library collection, thereby making it unusable to users. Mell (2021) identified the aim of a modern university library as largely to provide access to both

print and non-print collections and this makes it necessary to develop a balance between ownership and access to information or knowledge. This can be achieved by proper planning strategy including the planning for access control in line with the security requirement and the present and future mission or goals of the parent institutions. Ameen and Haider (2018) opined that access to collection is important as this service has supported scholarship in the humanities, sciences and social sciences and remains the key to intellectual freedom.

In contemporary times, libraries are increasingly turning to cloud computing to modernize their operations and services. Cloud computing offers libraries various advantages, including scalability, flexibility, cost-effectiveness, and improved accessibility. One prominent application of cloud computing in libraries is the management of digital collections. By leveraging cloud-based storage solutions, libraries can store vast amounts of digitized materials, such as e-books, journals, and archival documents, without the need for extensive physical infrastructure (Subirana, 2016). Cloud computing is a developing technology model for IT services which many organizations, establishments and even individuals in developed countries are adopting. It transforms the way systems are built and services delivered, providing libraries with an opportunity to extend their impact to clients and the society at large. Kelley in Kutty, (2019) maintains that cloud-based services provide a means for libraries to free resources on web and disseminate information to clients' cloud-based services also bring cutting-edge services to libraries that have less information technology expertise. In this age of information superhighway cloud-based services is important for it offers infrastructure, platform and software as a service.

Above all, because of the enormity of information resources and data embedded in it, cloud computing services is attracting and receiving a great deal of attention and patronage among organizations, establishments, government and individuals. As a web-based technology, cloud computing is a combination of technologies and tendencies (trends) that makes infrastructures and applications more dynamic, more flexible and replaceable. Applications such as e-mails, web conferencing, customer relationships management (CRM) are all tracked in one cloud. Libraries also use computers to run such other services as integrated library management software (ILMS) website or portal, digital library or institutional repositories (Onwubiko, Okorie, & Onu, 2021).

Showing the presence of libraries in the web, cloud computing technology helps university libraries to maintain record data, private and delicate data. They also adopt this technology for electronic journal access, hosting digital libraries, tracking statistical data and integrating library hosting. This implies that a considerable increase of digitized contents urges libraries, archives and learning resource centers to integrate new media of all types like record labels and film archives, neo documents and similar such materials into the general collection and special documents reserved areas (repositories) (Onwubiko, Okorie, & Onu, 2021). Moreover, cloud computing empowers libraries to adopt innovative technologies and services. Libraries can leverage cloud-based platforms for data analytics, artificial intelligence, and machine learning to gain insights into patron preferences, optimize collection development strategies, and personalize user experiences. By harnessing the power of the cloud, libraries can stay at the forefront of technological advancements and meet the evolving needs of their communities (Jiang & Deng, 2018).

As all these are made realizable by cloud computing technology, the utilization of this model in university library services in Nigeria would make the role of librarians and professionals more practical and pragmatic to the service they provide on daily basis. Cloud computing would enable libraries to provide seamless access to resources for patrons across diverse geographical locations. Through cloud-based library management systems, users can search for and access library materials from anywhere with an internet connection. This accessibility fosters inclusivity and expands the reach of library services beyond traditional boundaries (Eneh & Opara, 2020).

More so, public libraries of the modern cloud computing generation envisaged in Nigeria would witness a rapid transformation from conventional libraries to digital and virtual libraries, thus adopting cloud computing model to redesign and restructure the scheme of information services delivery (Onwubiko, Okorie, & Onu, 2021).

Although cloud computing services has the great potentials of revolutionizing university library and information services in Nigeria, it is essential for librarians and library professionals to have a solid understanding of this new technology landscape to move beyond a vague awareness of it to a more nuanced well-informed understanding of such concepts and also to adopt it.

Utilization of cloud computing technology is very important as library service delivery is now more

effective, efficient and timely compared to the traditional mode of operation and service delivery. It makes library operation easier ensures that information needed can be retrieved as quickly as possible and that knowledge are organized easily with less stress. Furthermore, it enhances user satisfaction with the information resources in the library. It saves the time of both library staff and patrons, prevents duplication of work and makes library services smooth and effective. Cloud computing enables library users access their files and applications through the cloud without the need for the application to be available on the user's device, thus reducing the security risks and the required hardware resources, and more. Nevertheless, without utilization of cloud computing technology, the library services will not be rendered effectively. There will be poor organization of knowledge and library operation will be difficult and stressful.

Preliminary observation has shown that university libraries are still striving to get acquainted to the use of cloud computing technologies. Most of them prefer the traditional library services delivery to those enhanced with the use of cloud computing technologies. This is the gap this study is meant to fill. It is on this backdrop that the researchers seek to unravel the mystery behind the research titled "Save it on the cloud and access anywhere: the utilization of cloud computing in university libraries for library services delivery in contemporary age.

Basically, library service delivery deals with the way librarians relate and behave towards the users, colleagues, organizations and the society. As a result of current trends and development in the profession, there are challenges and opportunities which have impact in the delivery of library services. As pointed out by Omekwu in Adam (2018), library service delivery is meant to support organisations, institutions and research by facilitating access to libraries extensive range of information resources and challenges. librarians are expected to brace up for the demand of their work by improving on their competency skills; knowledge and attitude to enable them provide appropriate library service delivery.

For a discourse of this nature and for the present technological pace around the world, the efficiency and relevance of any university library is dependent on the effective delivery of qualitative service to users as well as recognition and careful adaptation of measures in the provision of library and information services capable of meeting societal needs. It is therefore the responsibilities of librarians to deliver on their mandate to the users, colleagues and society by

ensuring fairness, justice and equity in the execution of services. The core values must be well articulated and knowledge supported with commitment that would help in upholding individual and collective responsibilities towards knowledge access and provision, doing right and upholding professionalism from the foundation of quality service delivery.

Library service delivery is vital for user's satisfaction. According to Adam (2018), the majority of university libraries offer circulation services, reference services, new arrivals list, Internet and current awareness services and photocopying services. A few of them offer Selective Dissemination of Information (SDI), newspaper clippings, interlibrary loan and fax. Eze and Uzoigwe (2018) and Ayodele and Mohammed (2018) stated that most university libraries in Nigeria provided a variety of services such as reference, Internet, interlibrary loans in support of university education; and provision of various library and information resources such as textbooks, newspapers and magazines, amongst others.

Umoh (2018) also highlighted the services rendered by academic libraries in Nigeria. According to him, circulation/borrowing, referencing, bibliographic verification, current awareness, reprographic, extension/community, technical, and interlibrary cooperation are some of the services provided by academic libraries in Nigeria. Lawal-Solarin (2018) investigated the information needs of students and the role of academic libraries in Covenant University library, Sango Ota, Ogun State. The library services mostly provided to library user in the university included lending service, Internet service, binding/photocopy service, reference services, and abstracting and indexing services, among others. The most used service was the lending service.

The digital age has brought an explosion of data, forever altering how we store and access information. Gone are the days of bulky floppy disks and overflowing filing cabinets. Today, we entrust our vital documents, cherished photos, and creative projects to the vast expanse of the cloud. Cloud computing, a cornerstone of modern technology, allows us to save data on remote servers, accessible from any device with an internet connection. The use of the term "cloud" has been an issue of contention among researchers. Yet understanding the concept of cloud is critical to grasp the issue of cloud computing. Over the past couple of years, various scholars have offered different viewpoints in a bid to define the concept of cloud and cloud computing. However, all the propositions more or less account for a single ideology. Some scholars trace the origin of the term "cloud" to the concealing nature of this technology's

framework where the system works for users yet they really have no idea about the inherent complexities that the system utilizes. What they do not realize is that there is a massive amount of data being pushed globally in real-time to make these applications work for them, the scale of which is simply amazing (Blokdijk & Menken, 2019).

At its core, cloud storage offers a simple yet revolutionary concept: ubiquitous access. By saving files on a remote server, we liberate ourselves from the physical constraints of traditional storage devices. No longer are we tethered to a specific computer or external hard drive. With an internet connection, we can access our data from a laptop at a coffee shop, a tablet on vacation, or even a smartphone while on the go. This mobility empowers us to be productive and connected, regardless of location. Cloud storage not only provides convenience but also fosters enhanced collaboration. Gone are the days of emailing bulky files back and forth. Cloud platforms allow multiple users to access and edit documents simultaneously, streamlining teamwork and ensuring everyone has access to the latest version. This collaborative power is invaluable for businesses of all sizes, enabling real-time document sharing and project management. However, the cloud isn't without its considerations. Security remains a paramount concern. Choosing a reputable cloud storage provider with robust security measures is crucial to ensure the privacy and integrity of our data. Additionally, relying on an internet connection can be a double-edged sword. While it grants access from anywhere, a lack of connectivity can temporarily hinder our ability to access stored files. Cloud computing technologies offer a transformative solution, enabling libraries to enhance access, efficiency, and scalability while reducing costs. Libraries have long been pillars of knowledge dissemination and community engagement, serving as hubs for learning, research, and cultural enrichment. However, in today's digital age, the traditional role of libraries is evolving rapidly, necessitating innovative approaches to service delivery.

In this 21st century era of information age, technology has become the concern of libraries, library managers and information professionals. Technology today plays a critical role in the provision of real time information to clients by libraries. For libraries, managers and professionals (information providers) cloud computing would provide the opportunity of realizing the aforementioned goal. But the question now is what is cloud computing? In the words of Suman and Singh (2018) cloud computing is not a new technology but a new form of computing that has not yet got a definite generally accepted definition and

interpretation. However, they maintain that cloud computing is a web-based technology, which is a new form of computing. It is a service provided on the internet or network. It is one of the most important in the 21st century that offers infrastructure, platform and software as a service. Cloud computing is a conjunction of technologies with trends that make infrastructures and applications more dynamic, more flexible and replaceable.

Cloud computing refers to the delivery of computing as a service rather than product, whereby shared resources, software and information are provided to computers and other devices as a metered service (charge for computing services based on usage, similar to how one is billed for water, electricity, phone call services, DSTV, GoTv, Startimes etc. subscriptions at home) over a network, infrastructure, storage of client data and applications that are accessed via a remote computer. However, Greenberg (2018) observed that in spite of the advantages the individual, as well as organizations, derive from the movement toward transitioning computing and storage applications to cloud computing, there are some applications that organizations are choosing not to transit. Cloud computing derived its name from the acronym CLOUD, which stands as C for "Computing resources", L for "Location independent", O for "Online accessibility", U for "Utility for users" and D for "Demand by users" (Yuvaraj, 2018). Computing has been in existence for a while now (Rajan & Shanmugapriya, 2022). According to Goldner (2020), the technology actually propelling cloud computing is the advent of internet, the increased reliability and reduced cost of internet, increased use of web-based applications, demand for applications access via multiple devices using multiple form factors. Cloud computing is "a style of computing in which massively scalable and elastic IT-enabled capabilities are delivered as a service to external customers using Internet technologies" (Petty & Forsling, 2019).

National Institute of Standards and Technology (NIST, 2021), sees cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. The description of Gartner Group and Forrester is cloud computing are apt. They are respectively of the opinion that cloud computing is that style of computing in which massively scalable and elastic, IT-enabled capabilities are delivered as a service to external customers using internet

technologies; and it is a pool of abstracted, highly scalable and managed computer infrastructure capable of hosting end-users (customers) applications and billed by consumption. All in essence imply that cloud computing is a type of computing that basically relies on sharing computing resources rather than having local servers or personal devices to handle applications. Cloud computing is a concept referring to a network computing model that relies on distributed systems to deliver computing services on demand. Rather than requiring local infrastructure and expertise to configure and manage hardware, cloud computing facilities remote access to robust computing power.

Cloud computing is a new technology model or technique for Information and Communication Technology services that is internet based where virtually shared servers provide software, infrastructure, platform devices and other resources and hosting customers on pay-as-you-use basis. All information that a digitized system has to offer is provided as a service in the cloud computing model. Users can access these services available on the Internet Cloud without having any previous know-how on managing the resources involved (Sahu, 2018). Cloud computing is a flexible model. In it, users can also build or prepare their own applications which can also be used by others through the Internet. Cloud computing in all its ramifications provides a common computing platform for users. It provides a shared pool of resources such as storage space, networks, computer processing power and specialized corporate and user applications. In effective and efficient service delivery to clients, cloud computing gives libraries the opportunity to extend their impact because of its transformation of the way systems are built and services delivered.

According to Tritt and Kendrick (2018), cloud computing provides layers of the cloud computing stack of Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Software as a Service (SaaS), but to libraries, SaaS cloud computing technologies are the most accessible and applicable form of cloud computing to library and information services. SaaS refers to software designed for end-users and made available over the Internet. Popular examples of SaaS include Google Docs, Evernote and Dropbox. SaaS computing technologies bring powerful options to those other organizations that do not have the expertise, staff, time or infrastructure to implement and support various computing services.

In view of the foregoing overviews, cloud computing in all its ramifications is anchored on the fulcrum of

virtualization, distributed computing, utility computing, networking and web software services. It is a service-oriented architecture, reduced information technology overhead for end-user, great flexibility, reduced total cost of ownership, on-demand services, increase network reliability and efficiency, as increasing the variety of technology resources available from user desktops. Breeding (2022) sums it up by saying “clouds, because of their massive redundancy and clustering are very fault tolerant and since cloud computing is elastic, it can expand or shrink as computer power needs increase or decrease”. However, by leveraging the vast resources of the cloud, we can save files anywhere and access them everywhere. This not only enhances convenience and mobility but also fosters collaboration and streamlines workflows. As cloud computing technology continues to evolve, we can expect even more innovative applications and services built upon this powerful and ever-present digital infrastructure.

Cloud computing is a popular and critical phenomenon in the provision of library and information services in advanced countries. Over there, libraries are adequately funded, staffed, equipped, automated and digitalized to promptly adapt to clients changes in demand and technology.

Omwansa, Waema, and Omwenga (2018) reviewed the adoption state of cloud computing across the African continent and reported that South Africa, Kenya, and Nigeria are the leading countries in the use of cloud computing in Sub-Saharan Africa as of the year 2013. They further analyzed the report of a survey carried out by Cisco and World Wide Worx (2018) which found that 50% of South Africa’s medium and large businesses were using cloud services, compared to 48% in Kenya and 36% in Nigeria. (Susanto, Almunawar, & Kang, 2022) also reviews that cloud computing has been identified as an affordable option which creates efficiency and effectiveness, reduction of costs involving electricity, bandwidth, operations, and hardware which does not require functional staff, in-house expertise, space, power, and infrastructure to perform.

Ahmed and Othman (2018) highlighted that cost reduction, relief from managing complex IT infrastructure, flexibility, and scalability as some of the advantages of cloud computing adoption. Yeboah-Boateng and Essandoh (2022) in their study of cloud computing usage among small and medium enterprises in developing economies found cost reduction on IT infrastructure and maintenance, improved communication, scalability, and business continuity as the main drivers of cloud adoption.

Biddick (2018) remarked that the most likely applications to migrate to cloud computing are storage and business applications, while specialized information technology applications, such as security, management, or compliance, are far less likely to migrate to cloud computing.

According to Ogunsola (2018), libraries in Nigeria tertiary institutions as the heart of the institution they serve, support research and learning, are therefore not left out in harnessing the opportunities presented by cloud computing service trend, in view of this is evidence to show gradual computerization of Nigerian libraries in the universities through the commencement of digitization and establishment of library information network with connectivity through the university campus network to the Internet. IT News Africa, revealed the successful establishment of digital libraries in three (3) Nigerian Universities by Mobile Telephone Network (MTN) Nigeria. These Universities include the Ahmadu Bello University, Zaria, the University of Lagos, and the University of Nigeria, Nsukka. Breeding (2022) and Goldner (2022) reported that libraries are beginning to adopt cloud computing services and technologies to meet the technological needs of their users thereby saving costs, ensuring flexibility, and enhanced data management. This is due to the benefits derivable from the adoption of cloud services. As Masillamani (2020) rightly noted, cloud computing promotes collaboration, and resource sharing among libraries, librarians, library users through its remote management capabilities.

Generally, cloud computing application is also feasible in the areas of acquisitions, cataloguing, process system, digital content and provision for inclusion of cutting-edge technologies used in libraries and supports various standards such as MARC 21, XML, Z39.50, Unicode and others that are directly related to library and information areas (Suman and Singh, 2018). Also, the critical areas of library services amenable to cloud computing include: Computing E-books Lending Services, Union/Share Cataloguing/OPAC, Digital Preservation/Scanning Service, Article Delivery Service, Current Awareness Service (CAS), Information Common, Collection Development, file sharing, information delivery, e-learning, information literacy and orientation and socialization (Suman and Singh, 2018).

There are a number of challenges that face the use of cloud computing services in libraries in developing nations. According to Ashima and Popli (2018), the cost implication for subscription cloud services and maintenance of access is a major challenge to libraries that are not financially buoyant, and this applies

especially to libraries in developing countries like Nigeria where poor funding of libraries has become a perennial issue.

Also, the shortage of skilled manpower to manage and maintain the required ICT Infrastructure and erratic power supply as part of the challenges faced by Virtual Libraries implementation (Aiyebilehin et al, 2018). These have made it practically difficult for Virtual Library in Nigerian Tertiary Institutions to be effectively maintained and its benefits fully harnessed. Coupled with the fact that virtual library is characterized by round the clock availability, these challenges posed a prohibitive cost to the libraries as against the limited available funds.

Other challenges militating against the implementation and use of cloud computing technologies in libraries are:

Security and Privacy Issues: Most cloud solution providers who provide cloud solutions for free or minimal cost, own the data ‘clients’ put into their cloud and are free to mine the date (Yudah and Geoffrey, 2018). This becomes a serious challenge as sensitive information pertaining to library users may be mined by these cloud solution providers.

Technical Issues: Yudah and Geoffrey (2018) have observed that in spite of cloud solutions being generally well maintained, often to a higher standard than in-house systems, there will be times the system may not work as required. Compounding this challenge will be the lack of skilled technical staff who will address the issues whenever they arise. Apathy by the traditionally trained librarians to acquiring new knowledge and skills in modern technologies that will help them remain relevant (Kimutai and Muli, 2018). Closely linked to this challenge is the inadequate training of young librarians in library schools on digital library operations. For Wasike and Njoroge (2018), inadequate power supply is a major challenge in Africa, to the application of ICTs in libraries. Alternative sources of power are very expensive and the cost of maintenance is very high.

Finance: In Nigeria, a major challenge that faces libraries, irrespective of the type of library is reduced budgetary allocations. Without finance, subscription to the cloud services will not be possible. Poor network and high cost of subscription are other challenges that grossly affect the deployment and usage of cloud computing services in Nigerian libraries. These facilities run on the internet, and most of the internet service providers have very weak network signals at a very high price.

Cloud computing is a developing phenomenon in the ICT, Internet and computing systems technology. It emerged due to developments in this 21st century supersonic information age hinged upon the Internet and associated technologies. Though new cloud computing is popular in libraries across advanced countries and fast spreading to libraries in Asian countries. Thus, what is also good for the goose is good for the gander. This is the motivation for this discourse and presentation of the strategic framework to achieve public libraries operational success in applying cloud computing technology in library and information services delivery.

These strategies include: Government to develop positive attitude to education and information service delivery to the people; an adjunct to the above is that government to come up with a favourable national policy on public library development; public library managers leveraging on the above to evolve and implement a robust and comprehensive ICT policy for service to clients (Onwubiko, Okorie & Onu, 2022). Bearing availability of required fund, library managers should expose present staff members to aggressive training and retraining programmes for them to achieve the new knowledge and skills in cloud computing technology in libraries.

University libraries generally to be adequately staffed because of the enormous demand made on them as a result of emerging changes in the ICT, Internet and computer systems technologies. A corollary to the above is that library managers to embark on strategic staff recruitment exercise that would focus on content, cloud and systems librarians. Cloud computing involves a huge financial outlay; hence libraries in general should be adequately funded. Also, libraries should be adequately provided with ICT facilities. Generally, information professionals to be amenable and adaptable to change and embrace the dynamics of the 21st century super supersonic information age (Onwubiko, Okorie & Onu, 2022)

The purpose of this study is to determine the utilization of cloud computing in university libraries in contemporary age.

Specifically, the objectives of the study will be to:

- Identify the cloud computing technologies utilized for university libraries in contemporary age.
- Determine the extent to which utilization of cloud computing technology contributes to

university libraries services in contemporary age.

- Ascertain the challenges affecting utilization of cloud computing technology for university libraries services in contemporary age.
- Proffer possible strategies for enhancing utilization of cloud computing technology for university libraries in contemporary age

2. Research Methodology

Descriptive survey was adopted for this study. This was found appropriate because it is more ideal for studying a spread population of librarians across Nigeria. The multi-stage sampling procedure was used to select the sample for this study. The first stage involved stratifying the Universities on the bases of geopolitical zones and using the simple random sampling to select one state from each of the six geopolitical zones. The states are Niger, Zamfara, Borno, Imo, Akwa-Ibom and Osun. In the second stage, the Universities in the six states were further grouped according to Federal, State and Private. At the third stage, the simple random sampling procedure was used to select one Federal, one State and one Private University from the grouping, giving a total of eighteen (18) Universities which are Federal University of Technology, Minna, Ibrahim Badamasi Babangida University, Lapai, Newgate University, Minna, Minna. Federal University, Gusau, Zamfara State University, Huda University, Gusau, University of Maiduguri, Bornu State University, Al-Ansar University, Federal University of Technology, Owerri, Imo State University, Maranathan University, Mgbidi, University of Uyo, Akwa Ibom State University, Ikot Akpaden, Topfaith University, Mkpatak, Federal University of Agriculture, Abeokuta, Tai Solarin University of Education Ijebu Ode and Hallmark University, Ijebi Itele, Ogun state. The final stage involved the use of purposive sampling of total population to draw respondents. An online Google form questionnaire was used for this study and was distributed to respondents through Nigerian Library Association state chapters' online platforms. One hundred and fifty-seven (157) questionnaire were sent back but one hundred and forty-eight (148) respondents accurately filled the form correctly, and as such were considered valid for analysis. Frequency, simple percentage were used to analyse the availability of cloud computing technologies, while Mean score was adopted to analyze the data collected from the respondents. The bench mark for analysis is accepted when the mean is 2.50 and above while a mean of less than 2.50 is rejected. This is because the responses or ratings of 2.50 and above indicates satisfaction or agreement, while those below 2.50 indicate

dissatisfaction or disagreement. It therefore serves as a reference point for identifying significant deviations from the mean within the dataset. The respondents

scale and value assigned is SA=4, A=3, D=2 and SD=1

3. Analysis of Data and Results

Research Question 1: What are the cloud computing technologies utilized in university libraries for Library Service Delivery in contemporary age?

Table 1: Mean score response of cloud computing technologies utilized in university libraries for Library Service Delivery in contemporary age

S/N	ITEMS	Used	Not Used
1	Cloud-based Integrated Library System (ILS) for cataloging and circulation	96(65%)	52(35%)
2	Cloud-hosted Digital Repository for archiving and accessing digital resources.	72(49%)	76(51%)
3	Cloud-based E-book and E-journal platforms for remote access.	67(45%)	81(55%)
4	Cloud-based collaboration tools for virtual team projects	86(58%)	62(42%)
5	Cloud-based Data Analytics for library usage insights	69(47%)	79(53%)
6	Cloud-based Interlibrary Loan systems for resource sharing.	58(49%)	90(61%)

Table 1 shows the mean response of the cloud computing technologies utilized in university libraries for Library Service Delivery in contemporary age. From the table it show that Cloud-based Integrated Library System (ILS) for cataloging and circulation (65%), Cloud-based collaboration tools for virtual team projects (58%), we're the cloud computing technologies utilized, while Cloud-based Interlibrary Loan systems for resource sharing (49%) Cloud-based E-book and E-journal platforms for remote access (45%), Cloud-based Data Analytics for library usage insights (47%) and Cloud-hosted Digital Repository for archiving and accessing digital resources (49%) we're not used as cloud computing technologies utilized in university libraries for Library Service Delivery in contemporary age.

Research Question 2: What is the extent to which cloud computing technology is utilized in university libraries for Library Service Delivery in contemporary age?

Table 2: Mean score response of the extent to which cloud computing technology is utilized in university libraries for library service delivery in contemporary age

S/N	ITEMS	VHE	HE	LE	VLE	\bar{x}	Decision
1	Cloud technology enhances remote access to library resources.	47	53	27	21	2.9	Accepted
2	Cloud solutions improve resource availability and accessibility.	54	59	16	18	3.0	Accepted
3	Cloud-based collaboration tools enhance user engagement and interaction.	51	47	24	26	2.8	Accepted
4	Cloud-based analytics improve decision-making for resource allocation.	49	62	19	18	3.0	Accepted
5	Cloud solutions streamline administrative tasks, improving efficiency.	42	60	23	22	2.8	Accepted
6	Cloud technology leads to overall improvement in user satisfaction.	47	53	27	21	2.9	Accepted

Table 2 shows the mean response of the extent to which cloud computing technology is utilized in university libraries for Library Service Delivery in contemporary age. From the table it show that Cloud solutions improve resource availability and accessibility (3.0), Cloud-based analytics improve decision-making for resource allocation Cloud (3.0), Cloud technology enhances remote access to library resources (2.9), Cloud technology leads to overall improvement in user satisfaction (2.9), Cloud-based collaboration tools enhance user engagement and interaction (2.8) and Cloud solutions streamline administrative tasks, improving efficiency (2.8) we're utilized to a high extent.

Research Question 3: What are the challenges affecting utilization of cloud computing technology in university libraries for Library Service Delivery in contemporary age?

Table 3: Mean score response of the challenges affecting utilization of cloud computing technology in university libraries for library service delivery in contemporary age

S/N	ITEMS	SA	A	D	SD	\bar{x}	Decision
1	Insufficient internet bandwidth affecting cloud performance.	40	53	23	22	2.8	Accepted
2	Data security concerns hinder adoption of cloud solutions.	40	62	29	17	2.8	Accepted
3	Limited staff training on cloud technology usage.	45	53	29	17	2.9	Accepted
4	Budget constraints limit investment in cloud solutions.	43	54	24	27	2.8	Accepted
5	Compatibility issues with existing systems impede integration.	48	53	30	17	2.9	Accepted
6	Resistance to change from traditional to cloud-based services.	49	62	20	17	3.0	Accepted

Table 3 shows the mean response of the challenges affecting cloud computing technology in university libraries for Library Service Delivery in contemporary age. From the table it show that Resistance to change from traditional to cloud-based services (3.0), Limited staff training on cloud technology usage (2.9), Compatibility issues with existing systems impede integration (2.9), Insufficient internet bandwidth affecting cloud performance (2.8), Data security concerns hinder adoption of cloud solutions (2.8), and Insufficient internet bandwidth affecting cloud performance (2.8) we're challenges affecting utilization of cloud computing technology in university libraries for Library Service Delivery in contemporary age.

Research Question 4: What are possible strategies for enhancing utilization of cloud computing technology in university libraries for Library Service Delivery in contemporary age?

Table 4: Mean score response of possible strategies for enhancing utilization of cloud computing technology in university libraries for library service delivery in contemporary age

S/N	ITEMS	SA	A	D	SD	\bar{x}	Decision
1	Providing regular staff training on cloud technology.	51	47	24	26	2.8	Accepted
2	Allocating dedicated budget for cloud technology investments.	49	62	19	18	3.0	Accepted
3	Implementing robust data security measures for cloud solutions.	42	60	23	22	2.8	Accepted
4	Collaborating with cloud service providers for tailored solutions.	47	53	27	21	2.9	Accepted
5	Promoting awareness and benefits of cloud technology among users.	49	62	19	18	3.0	Accepted
6	Creating a roadmap for phased migration to cloud-based services.	64	49	16	19	3.1	Accepted

Table 4 shows the mean response of the possible strategies for enhancing utilization of cloud computing technology in university libraries for Library Service Delivery in contemporary age. From the table it show that Creating a roadmap for phased migration to cloud-based services (3.1), Allocating dedicated budget for cloud technology investments (3.0), Promoting awareness and benefits of cloud technology among users (3.0), Collaborating with cloud service providers for tailored solutions (2.9), Providing regular staff training on cloud technology (2.8) and Implementing robust data security measures for cloud solutions (2.8) we're are possible strategies for enhancing utilization of cloud computing technology in university libraries for Library Service Delivery in contemporary age.

4. Discussion of Findings

Cloud computing technologies utilized in university libraries for Library Service Delivery in contemporary age.

This study revealed that the cloud computing technologies utilized in university libraries for Library Service Delivery in contemporary age were Cloud-based Integrated Library System (ILS) for cataloging

and circulation, Cloud-based collaboration tools for virtual team projects, we're the cloud computing technologies utilized, while Cloud-based Interlibrary Loan systems for resource sharing, Cloud-based E-book and E-journal platforms for remote access, Cloud-hosted Digital Repository for archiving and accessing digital resources and Cloud-based Data Analytics for library usage insights we're not used as cloud computing technologies utilized for library service delivery in university libraries for Library Service Delivery in contemporary age.

Omwansa, Waema, and Omwenga (2018) reviewed the adoption state of cloud computing across the African continent and reported that South Africa, Kenya, and Nigeria are the leading countries in the use of cloud computing in Sub-Saharan Africa as of the year 2013. They further analyzed the report of a survey carried out by Cisco and World Wide Worx (2018) which found that 50% of South Africa's medium and large businesses were using cloud services, compared to 48% in Kenya and 36% in Nigeria. (Susanto, Almunawar, & Kang, 2022) also reviews that cloud computing has been identified as an affordable option which creates efficiency and effectiveness, reduction of costs involving electricity, bandwidth, operations,

and hardware which does not require functional staff, in-house expertise, space, power, and infrastructure to perform.

Ahmed and Othman (2018) highlighted that cost reduction, relief from managing complex IT infrastructure, flexibility, and scalability as some of the advantages of cloud computing adoption.

The extent to which utilization of cloud computing technology in university libraries for library service delivery in contemporary age

The findings of the revealed that The extent to which utilization of cloud computing technology university libraries for Library Service Delivery in contemporary age included; that Cloud solutions improve resource availability and accessibility, Cloud-based analytics improve decision-making for resource allocation Cloud, Cloud-based collaboration tools enhance user engagement and interaction, Cloud technology enhances remote access to library resources , Cloud solutions streamline administrative tasks, improving efficiency and Cloud technology leads to overall improvement in user satisfaction we're utilized to a high extent.

Breeding (2022) and Goldner (2022) supported that libraries are beginning to adopt cloud computing services and technologies to meet the technological needs of their users thereby saving costs, ensuring flexibility, and enhanced data management. This is due to the benefits derivable from the adoption of cloud services. As Masillamani (2020) rightly noted, cloud computing promotes collaboration, and resource sharing among libraries, librarians, library users through its remote management capabilities.

The challenges affecting utilization of cloud computing technology in university libraries for library service delivery in contemporary age

The findings of the study the challenges affecting utilization of cloud computing technology in university libraries for Library Service Delivery in contemporary age were Identified as Limited staff training on cloud technology usage, Budget constraints limit investment in cloud solutions, Compatibility issues with existing systems impede integration, Data security concerns hinder adoption of cloud solutions, Resistance to change from traditional to cloud-based services and Insufficient internet bandwidth affecting cloud performance we're challenges affecting utilization of cloud computing technology in university libraries for library service delivery in contemporary age.

This aligned with Ashima and Popli (2018), they discovered that the cost implication for subscription cloud services and maintenance of access is a major challenge to libraries that are not financially buoyant, and this applies especially to libraries in developing countries like Nigeria where poor funding of libraries has become a perennial issue.

Also, the shortage of skilled manpower to manage and maintain the required ICT Infrastructure and erratic power supply as part of the challenges faced by Virtual Libraries implementation (Zam, 2019). These have made it practically difficult for Virtual Library in Nigerian Tertiary Institutions to be effectively maintained and its benefits fully harnessed. Coupled with the fact that virtual library is characterized by round the clock availability, these challenges posed a prohibitive cost to the libraries as against the limited available funds.

Possible strategies for enhancing utilization of cloud computing technology in university libraries for library service delivery in contemporary age

The findings of the study indicates possible strategies for enhancing utilization of cloud computing technology in university libraries for Library Service Delivery in contemporary age are Allocating dedicated budget for cloud technology investments, Collaborating with cloud service providers for tailored solutions, Implementing robust data security measures for cloud solutions, Promoting awareness and benefits of cloud technology among users, Creating a roadmap for phased migration to cloud-based services and Providing regular staff training on cloud technology we're are possible strategies for enhancing utilization of cloud computing technology in university libraries for library service delivery in contemporary age.

Onwubiko, Okorie and Onu, (2022) identified some strategies including; Government to develop positive attitude to education and information service delivery to the people; an adjunct to the above is that government to come up with a favourable national policy on public library development; public library managers leveraging on the above to evolve and implement a robust and comprehensive ICT policy for service to clients. Bearing availability of required fund, library managers should expose present staff members to aggressive training and retraining programmes for them to achieve the new knowledge and skills in cloud computing technology in libraries.

5. Conclusion

The utilization of cloud computing technology in university libraries for library service delivery in contemporary age offers a host of benefits, including increased scalability, accessibility and cost-efficiency. It allows libraries to provide services and resources more flexible, ensures seamless remote access and facilitates collaboration with other institutions. By harnessing the power of the cloud, libraries can modernize their operations, enhance user experiences, and better adapt to the evolving digital landscape, making it a valuable asset in the advancement of university library services.

6. Recommendations

Based on the findings of the study, the following recommendations were made:

- University library management should increase the training sessions or resources to help librarians know the importance of cloud computing technology for library service delivery.
- More emphasis should be placed on strategizing and re-strategizing to ensure a proper integration of library routines into cloud computing technology for library service delivery.
- There's need for collaboration between librarians, IT staff, University management and other stakeholder to ensure that infrastructure that will enhance the implementation of cloud computing technology for library service delivery.

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