

**Characteristics of Cloud Computing and Digital Literacy Competency as  
Determinants of Service Quality among Library Personnel in Federal Universities in  
South-west Nigeria**

**Adedayo Temitope AKINYEMI  
LCU/PG/002222**

**Being a Post-field submitted to the Department of Information Management,  
Faculty of Communication and Information Sciences, Lead City University, Ibadan,  
Nigeria**

**In partial fulfilment of the Requirements for the Award of Doctor of Philosophy  
(PhD) in Library and Information Science**

**2023**

## Certification

This is to certify that **Adedayo Temitope AKINYEMI** with matriculation number **LCU/PG/002222** carried out this research work titled “**Characteristics of Cloud Computing and Digital Literacy Competency as Determinants of Service Quality among Library Personnel in Federal Universities in South-west Nigeria**” in the Department of Information Management, Faculty of Communication and Information Sciences, Lead City University, Ibadan, Oyo State, for the award of Doctor of Philosophy (PhD) in Library and Information Science and that this has not been previously submitted.

---

**Dr. S. O. Tunmibi**  
(Supervisor)

---

**Date**

---

**Dr. S. V. Adeyeye**  
(Head of Department)

---

**Date**

## **Dedication**

This research work is dedicated to Almighty God.

Lead City University Ibadan DO NOT COPY

## Acknowledgement

The completion of this PhD Thesis has been made possible by the assistance of many institutions and individuals. I gathered so much knowledge from this thesis with the guidance of my supervisor Dr. S. O. Tunmibi.

I am ever appreciative of the services provided by every staff of the University in Lead City University, Ibadan and to all my editors for their support. I extend my appreciation to the Dean, Faculty of Communication and Information Science, Professor Lambert Ihebuzor as well as every lecturer in the faculty. My sincere gratitude goes to Prof. Adekemi Oredein, The Provost, College of Postgraduate Studies, and other members of staff of the Postgraduate School Lead City University for providing a friendly and conducive environment for learning. I appreciate the Head of Department, Dr. S. V. Adeyeye for her continued support. Special thanks are due to all lecturers of Information Management Department, Professor E.A., Erwat, Dr. T. E. Adenekan, Dr. O.D. Bakare, Dr. S. O. Tunmibi, Dr. K. O. Lateef, Dr. O. C. Ajibare, Dr. F. B. Oguntoye, Mr. P. B. Olushola, Mrs. K.O. Popoola, Mrs. O.A. Ologbosere, Mrs. O.R. Oboh, Mr. I. A. Adeniran, Mr. M. E. Ogunwumiju, Mrs. V. O. Ahamze, Mr. A. A. Adeyemi.

I want to specially acknowledge the support of my one and only darling crown, Engineer Olayinka Olukunle Akinyemi during the course of this study and also to my Mrs I.O. Ayoade, you are highly appreciated. My appreciation also goes to my boss in person of Dr G.O. Oyewole, Dr Mrs. C.E. Olaotan, Dr. Egunjobi, Mr Ogunleye, Mrs Nze, Mrs Adedeji ,Mr Adesina, Mr Olawepo and others for their unflinching support. And to all my colleagues and friends, your presence has indeed added a lot of fun and assistance throughout the programme.

The above-listed personnel and institution have assisted a lot in the completion of this thesis. However, the errors or oversights herein are mine alone.

Lead City University Ibadan DO NOT COPY

## **Abstract**

*Library service quality has long been a topic of interest to library personnel but it has become more significant with technological advancement which has opened up various sources of information to rival, or at times, even surpass what the library is capable of offering. This study investigated the correlation between characteristics of cloud computing, digital literacy competency, and quality of services among library personnel in federal universities in southwest Nigeria. The descriptive survey research design and a mixed method approach was adopted for this study. The population was 243 library personnel (237 library personnel & 6 university librarians) from Federal Universities in Southwest Nigeria. Total enumeration was used. A validated questionnaire was used to elicit response from 237 respondents of the sampled universities, while 6 Librarians were interviewed accordingly. A reliability coefficient value for each variable in this study was recorded as follows; Cloud Computing (CC) = 0.85, Digital Literacy Competency (DLC) = 0.75; Service Quality (SQ) = 0.82. Characteristics of Cloud Computing significantly influence service quality (Adj.  $R^2 = 0.284$ ,  $F(1, 200) = 80.631$ ,  $p < 0.05$ ); Digital literacy competency has a moderate and positive correlation with service quality (Adj.  $R^2 = 0.262$ ,  $F(1, 200) = 72.241$ ,  $p < 0.05$ ), CC and DLC significantly influence SQ (Adj.  $R^2 = 0.340$ ,  $F(2, 199) = 52.827$ ,  $p < 0.05$ ). This study concluded that characteristics of cloud computing and digital literacy competency have moderate and positive correlation with service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. The study recommended that Library personnel in the federal universities in Southwest, Nigeria should endeavour to engage in training unceasingly so as to stay relevant in the everchanging world.*

**Keywords:** Cloud computing, Digital literacy competency, Service quality, Academic library, Library personnel, Federal universities

**Word Count:** 282

## Table of Contents

<b>Content</b>	<b>Page</b>
Title Page	i
Certification	ii
Dedication	iii
Acknowledgement	iv
Abstract	v
Table of Contents	vi
List of Tables	ix
List of Figures	x
Abbreviations	xi
<b>Chapter One – Introduction</b>	
1.1 Background to the study	
1.2 Statement of the problem	
1.3 Aim and objectives of the study	
1.4 Research questions	
1.5 Hypothesis	
1.6 Significance of the study	
1.7 Scope of the study	
1.8 Limitation of the study	
1.9 Operational definition of terms	
Endnotes	
<b>Chapter Two – Review of related literature</b>	
2.1 Conceptual Review	
2.1.1 Overview of Service Quality	
2.1.2 Perceived characteristics of Cloud Computing	
2.1.3 Digital Literacy Competency	
2.2 Theoretical Framework	
2.2.1 LibQual+	
2.2.2 Innovation Diffusion Theory	

- 2.2.3 Digital Literacy Competency Framework
- 2.3 Review of Empirical Studies
  - 2.3.1 Cloud Computing and Service Quality
  - 2.3.2 Digital Literacy Competency and Service Quality
- 2.4 Conceptual Model
- 2.5 Summary of Literature Reviewed
- Endnotes

### **Chapter Three – Methodology**

- 3.1 Research design
- 3.2 Population of the study
- 3.3 Sample and sampling techniques
- 3.4 Description of research instrument
- 3.5 Validation of Research Instrument
- 3.6 Reliability of the Research Instrument
- 3.7 Method of Data Collection
- 3.8 Method of Data Analysis
- Endnotes

### **Chapter Four: Results and Discussion of Findings**

- 4.1 Demographic Data of Respondents
- 4.2 Analysis of Research Questions
- 4.3 Test of Hypotheses
- Endnotes

### **Chapter Five: Conclusion**

- 5.1 Summary of Findings
- 5.2 Conclusion
- 5.3 Recommendations
- 5.4 Contribution to knowledge
- 5.5 Suggestion for further research

Bibliography

Appendices

Bio-Data

University Compliance Form

**List of Tables**

<b>Table</b>	<b>Title</b>	<b>Page</b>
3.1	Population of the study	
3.2	Results of Pilot Study	
3.3	Sample size distribution	

Lead City University Ibadan DO NOT COPY

## List of Figures

Title	Page
2.5 Conceptual Model	

Lead City University Ibadan DO NOT COPY

## Abbreviations

CC	-	Cloud Computing
DLC	-	Digital Literacy Competency
SQ	-	Service Quality

Lead City University Ibadan DO NOT COPY

## **Chapter One**

### **Introduction**

#### **1.1 Background to the Study**

Service quality is an evaluation of how well a service lives up to the customer's expectations. Additionally, service quality has been defined as the extent to which a particular service adheres to client requirements<sup>1</sup>. These concepts recognize the importance of viewing service from the viewpoint of the consumer rather than management. Customer happiness quality and customer loyalty, for example, have been proven to be strongly correlated with service quality. The main focus of businesses and service providers has thus shifted to providing high-quality services to their customers to achieve the objectives they have set for themselves, such as to make a profit, remain competitive over the long term, or ensure customer satisfaction. Therefore, the first step in keeping customers/ users in today's cutthroat marketplace is to evaluate service quality. Each organization, whether, they are concerned with profit making or simply providing services for public benefit, are well aware of the need to re-evaluate the scope and quality of services they offer and develop systems to ensure that their services continue to meet users' expectation. Although academic libraries do not offer services to gain profits, they are also concerned about the quality of services they offer their clients<sup>2</sup>.

Academic library services revolve around the gathering, organization, preservation, interpretation, and dissemination of information to support their clients in their quest to create more knowledge. To achieve this, libraries offer services such as reference services (both online and offline), circulation services, research advisory services, bibliographic completion, indexing and abstracting services, information retrieval services, and a host

of other services targeted at ensuring that the information needs of their clients are met adequately<sup>1,3</sup>. These services are usually provided in full consideration of and cooperation with their users' needs and expectations. However, while the library has always been mindful of the need to satisfy its users, it is even more important now that users have access to a variety of alternative channels of information delivery, many of which are more convenient and can compete on cost with the library.

Just as corporate organizations operate in a fiercely competitive business environment so does the library operates in a competitive information environment. Academic libraries should focus on exceeding users' expectations to thrive and expand their user base. User perception and expectation studies have grown to be one of the most well-liked research in the field of service quality in many academic libraries<sup>1</sup>. Service quality, which is viewed as crucial for service firms to position themselves successfully in a competitive setting, has been determined by consumer expectations and satisfaction. As a result, service quality has taken on more significance to information services providers.

Initially, when the business world realized the need to measure service quality, there was some level of confusion about the exact measures to apply in measuring the quality of services before the SERVQUAL model was developed. The model holds that quality service is characterized by a number of measurable factors such as responsiveness, competence and guarantees, tangibles, and resources all of which have been directly linked to users' satisfaction<sup>3</sup>. Ten factors that determine the quality of service were identified as a result of a pioneering study. These factors are accessibility, communication, competence, courteousness, credibility, reliability, responsiveness, security, tangible, and understanding or knowing the customer. The initial ten factors

were later developed into a scale grouped into five main headings namely; reliability, responsiveness, empathy, assurance, and tangibles dimensions<sup>4</sup>.

Similarly, when libraries started their attempt to evaluate service quality, there was no standard model to do it. So many researchers have adapted the SERVQUAL model to measure library service quality. However, library personnel were always aware that a model designed for the use of profit-oriented service providers would not meet the needs of libraries. With the inadequacies of the SERVQUAL as an instrument of library services quality evaluation becoming glaring, scholars in the field of librarianship came up with the LibQUAL which was adapted from the SERVQUAL to meet the peculiar needs of libraries.

LibQUAL is a web-based survey to measure the quality of library services. It is designed to be administered to library users to obtain information about their, desired, and perceived service levels. It has three dimensions: Library as Place, Information Control, and Affect of Service<sup>5</sup>. The LibQUAL represents a paradigm shift away from the era where the number of library holdings and counts of their usage are used to gauge the quality of library services. As a result, library service quality in this study is conceptualized as the gap between a library user's expectations and perceptions of service quality in the library<sup>6</sup>.

As laid out in the LibQUAL, everything that users expect from the library can be grouped under three main headings of which the first being the affect of service. " The affect of service as is used in the model describes library personnels' hospitable attitudes toward patrons in the library. Affect of service as a construct presents that patrons of libraries anticipate library personnel to consistently be pleasant and instill confidence in

information users. Studies have stressed the need for library personnel to be approachable and welcoming<sup>4,7,8</sup>. Nothing less is expected of a library (virtual & physical), a place where many people go in search of knowledge. It is a typical practice in all service providers and other business organizations working with people to guarantee that their "front desk" workers be nice and kind towards the clients. In the context of the library, the library service, technology, and process are also expected to be user-friendly. Ease of use and accessibility are big issues in information professions and libraries are judged based on how smoothly people can access the information resources available in and through the library.

Thus, affect of service in a technology-driven environment can be taken to mean the rating of library personnel in terms of their ability and readiness to guide users to the most relevant, accurate, and adequate information. It also covers how the services provided by libraries (virtual & physical) are easily accessible, and in the case of library patrons running into difficulties in accessing services, how readily available is expert support to guide the patrons and ensure that they conduct a successful information-seeking task. Thus, affect of service as used in this study refers to how the technology and human resources in the library have come together to make it easy for information users to access the collections and services provided by the library<sup>6</sup>. It denotes a willingness to help users, courteous assistance, and reliable individual attention. Together their emphasis is on users' satisfaction with the delivery of the latter stages of library service which are information search and retrieval.

Libraries must make sure they gather information items that are relevant to the pedagogical and research needs of the academic staff on the one hand and the learning

objectives of students on the other for them to be effective in accomplishing the goals of tertiary education<sup>4</sup>. The caliber of information they can gather, the speed at which information can be acquired, and the use of efficient acquisition procedures all affect how well they function as libraries. In this age of information explosion, libraries must raise the quality of their offerings in order to fulfill customer expectations. When libraries go above and beyond what users expect, it becomes possible to achieve very high levels of user satisfaction<sup>7</sup>.

Researchers have proposed that academic and research libraries can distinguish their services through amiable, helpful, and informed assistance as well as the greatest technical resources accessible by delivering quality services and user satisfaction. The personnel of academic libraries must be aware of the diverse requirements and expectations of their users in order to make every effort to accommodate those needs and expectations. Protecting, and ensuring that users can access information materials depends heavily on its financial resources. Nigerian libraries have not been able to effectively deliver quality library services due to various challenges such as lack of technical skills, inadequate infrastructure, and unfriendly user interfaces<sup>8</sup>. This challenge that has made library services seem unfriendly also has to do with information control.

Information control is another dimension of the libqual. This has to do with the level of autonomy information users are provided in accessing the information collected in the library. According to the LibQUAL+, information control is defined as "if users can find the necessary information in the library in the format of their choice, independently and autonomously". The eight questions that were developed to characterize this concept focus on three main areas which are: whether or not accurate print and electronic

resources are available in the collections; whether or not users can access the resources they need independently; and how up-to-date and user-friendly the library's access tools are. From the perspective of library personnel, information control means creating all the necessary information surrogates and information retrieval tools such as indexes, abstracts, bibliography, Online Public Access Catalog (OPAC), web portals, and other bibliographic control to ensure that information users can easily access the available information resources without any bottlenecks.

Library as Place" refers to the library's digital and physical setting as a place of learning, collaboration, and creative inspiration. It focuses on the experience of the library users when they use both the digital & physical library space. With this at the back of their minds, libraries are expected to create an environment that is conducive to learning and research. The library must create an ambiance of quietness aesthetic that allows users to concentrate and make the entire space comfortable and friendly<sup>9</sup>. In the modern digital environment, the library can employ technology to declutter the library by investing in electronic books and journals. It can also reduce the number of visitors by providing online information services. No matter the mode of service, library users are also going to evaluate the library based on the services it renders. This is taken care of by the construct; affect of service.

Judged on these dimensions, Nigerian federal universities libraries are often found wanting with library patrons complaining of noisy, crowded, and cramped library halls. Library patrons have also complained that many digital-based services provided by the library are not user-friendly. This has led to several strategies being proposed to improve the service quality in university libraries in Nigeria. Among the strategy proposed are

upskilling library personnel, remodeling user education, collaboration with faculties among others. However, among the factors that have not been explored in detail include the characteristics of cloud computing and the digital literacy competency of library personnel.

Cloud computing, in its most basic definition, refers to online data processing. Here, "cloud" refers to the enormous networks of hardware and software used to provide a variety of services to the client via the internet<sup>10</sup>. The term "cloud computing" refers to a model of service delivery in which numerous resources, including software, a platform, and data, are made available to users over the internet. The adoption of cloud computing provides three main categories of services, or "layers," as they are sometimes called. These are Infrastructure-as-a-Service (IaaS), Platforms-as-a-Service (PaaS), and Software-as-a-Service (SaaS)<sup>11</sup>.

Accessing these services requires an active internet connection because they are distributed via the web<sup>12</sup>. In practice, cloud computing refers to the practice of leasing out various types of virtualized computer resources, such as servers, networks, storage spaces, and application programming interfaces, on a utility or as-needed basis to users via the internet. This has the advantage of taking the responsibility of investing in hardware, computing expertise, and security away from an organization such as libraries. It is a cost-effective way of applying technology to library operations.

Many organizations, including libraries, have therefore shifted their focus to the adoption of cloud services. Technological advancements have provided opportunities to transform library services and operations from a lethargic and indifferent state to a more proactive and result-oriented state<sup>13</sup>. Cloud computing is one of the leading information and

communication technologies that is currently bolstering and enhancing library services and activities. Since the advent of cloud computing, many types of library services have been made available for remote online distribution. Data storage, servers, databases, networking, and software are all examples of such resources. The characteristics of cloud computing may drastically re-engineer and regenerate library operations to better facilitate the delivery of effective information services, which can significantly increase the efficiency of library personnel<sup>13</sup>.

It has been argued that implementing cloud computing at institutions like libraries is the most appropriate step towards improving the quality of library services. Indeed, it offers numerous advantages to academic libraries. First, it frees them from maintaining local servers with its attendant cost of alternative power supply, space provision, and recruitment of staff to manage it. It also ensures that more people will have access to the library resources than is possible with a local server. In addition, the adoption of cloud computing also allows for the creation of a unified data set that draws upon resources from numerous libraries. As a technology, the adoption of cloud computing however depends on perceived system characteristics such as relative advantage, complexity, and compatibility.

Like any other technology, potential users make the decision to adopt cloud computing based on the perception of relative advantage. This is the extent to which cloud computing is viewed as superior to the existing system being used by the library or to other alternatives that can be adopted. Libraries typically accept new technology if it can help them achieve strategic and operational success. When compared to other IT models, cloud computing is preferable since it cuts expenses, saves time, boosts library

productivity and profile, and promotes the creation of library consortia<sup>14</sup>. The flexibility and scalability of the cloud gave them better oversight of library operations and IT costs. To put it another way, if cloud services are deployed correctly, they will make it easier and cheaper for libraries to carry out their operations more effectively. The pay-as-you-go model, increased scalability and flexibility, and simplified installation and upgrade process are just a few of the previously unavailable advantages cloud computing offers libraries. Libraries and other organizations are more inclined to utilize cloud computing when they see a clear benefit to doing so. They are also more likely to consider the compatibility of cloud services with their current and planned mode of operation.

The compatibility of innovations such as cloud computing has to do with the perception of potential users, in this case, libraries, that their setup and functioning align with their usual manner of operation<sup>14</sup>. For instance, cloud computing is applied to digital library services such as the provision of scholarly databases, institutional repositories, digital reference services, and user education among others. Libraries that do not offer any of these services and have no plan of offering them in the near future may not see the need to adopt cloud computing. On the other hand, libraries that have subscribed to databases, invested in internet infrastructure, and acquire a significant volume of digital resources which it wishes to disseminate to a wider audience in a cost-effective manner may be eager to adopt cloud computing. Another dimension to compatibility is the nature and level of skills of available library personnel. Skilled personnel are an integral part of any system set-up. As a result, libraries without personnel skilled in the use of digital systems may not see the need of adopting cloud computing. It can therefore be asked whether the

reported low level of cloud adoption in Nigerian libraries is due to a lack of skilled personnel, little or no digital services, and a lack of the necessary infrastructure.

The adoption of clouding may be an important strategy to enhance library service quality but it is not the only factor that can boost service quality. The digital literacy competency of library personnel has also been identified by scholars as a major factor in effective library service provision in the 21<sup>st</sup> century<sup>15</sup>. Digital literacy competency is the new concept that replaced digital literacy which is the ability to find, assess, use, and produce content through the use of digital technology, communication tools, and networks. Digital literacy competency has been described as the aptitude for processing digital data and information in a variety of ways and making effective use of it. Also, it is the skill of being productive in a digital setting. Media comprehension, data and image replication, and the capacity to critically assess and apply knowledge learned from digital settings in order to thrive in the modern world<sup>15</sup>. For library personnel, digital literacy competency includes the ability to identify and expertly use appropriate technologies for information acquisition, organization, preservation, processing, and dissemination. The list is not exhaustive but these functions identified are at the core of library operation and any library personnel capable of pulling them off would have contributed to the quality of service in the library. However, for the sake of universality, there are frameworks developed to measure digital literacy competency.

One of the most comprehensive framework to measure digital literacy competency were developed by the European Union. The framework called DigComp outlines five dimensions of digital literacy competency namely; information and data literacy, communication and collaboration, digital content creation, Online safety, and problem-

solving. The ability to identify information demands and to locate and obtain digital data, information, and content constitute the core of information and data literacy. This means that library personnel should be able to evaluate the usefulness of information source and their contents and collect and maintain order in large quantities of digital information and content<sup>15</sup>.

The second dimension is collaboration. This means that the digital literacy competency of library personnel includes being able to interact, communicate, and collaborate using digital tools while respecting and learning from differences in background, experience, and perspective of others. A digitally competent library personnel is expected to play his/her part in society by using digital services provided by both their institutions and other related organizations and by being involved in all technology-related activities in their libraries. In addition, collaboration also includes the ability to control one's online identity, reputation, and presence.

Library personnel are also expected to be experts in digital content creation. They should be able to produce and refine digital media with an awareness of how copyright and licenses should be applied, enhance and integrate information and content into an existing body of knowledge, and can clearly communicate computer system instructions. This competency is more important in the provision of digital reference services, research support, and information literacy. In addition, library personnel are expected to be agents in making the digital space safe for themselves and others.

Safety in digital spaces is safeguarding equipment, material, information, and identity. In order to safeguard one's mental and physical health, and to be cognizant of the potential

of digital tools to promote communal prosperity and broaden participation in society, one must learn how to navigate the cyberspace safely and to secure one's identity and sensitive information. This skill also enables an individual to be conscious of how their usage of digital technologies affects the natural world<sup>16</sup>. This competency demands that library personnel can responsibly use computer systems without exposing themselves and their organizations to identity thieves, hackers, and online bullies. They should also be able to safeguard the digital information that came into their possession by not misusing them for personal gain and most, importantly, they should not be irresponsible and uncaring in dealing with library patrons and the general public in cyberspace. Perhaps the most important of the competency is using technology to solve problems.

The fifth dimension of digital literacy competency is the ability to use digital resources for problem-solving. The objective of libraries is to meet the information needs of their patrons and library personnel are expected to use their skills and resources at their disposal to solve the information-related problems facing library patrons. Library personnel are expected to be adept at figuring out the information need of library patrons and fixing nagging issues with software and hardware in digital settings. They should also be able to use technology to produce new information and develop new techniques and services through the use of digital means. Most importantly, they should be able to understand their digital literacy competency gaps in order to address them. By doing this, they are also able to help library patrons to improve their digital skills<sup>16</sup>.

The combination of all these competencies with the characteristics of cloud computing offers a great opportunity for Nigerian academic libraries to turn around the current situation in which students and lecturers opt for search engines and other information

sources for information instead of the library. The current reality is that information and communication tools have created several competitors for the library as a source of information. The source that attracts the largest followers therefore will be one with the highest perceived quality of service<sup>17</sup>.

As pointed out by a scholar, user evaluation of library services is subjective. It depends on the level of information needed, exposure to other service providers, and personal attributes<sup>17</sup>. Modern academic library users who have been exposed to the power of google expect similar services from the library. They usually come to the library expecting to find all the information resources they need neatly arranged and offered to them without any delay. Recognizing the level of expectation is important because it shows that information users are now more difficult to satisfy than ever.

However, while the characteristics of cloud computing and the acquisition and development of digital literacy competency of library personnel have been promoted as effective in enhancing the quality of library services, Nigerian libraries are neither rushing to adopt cloud computing nor are library personnel doing much to improve digital literacy competency. Reports have it that few academic libraries in Nigeria are using cloud computing and many that are making the effort to adopt cloud computing are not getting the required support from the management<sup>18,19</sup>. In addition, researchers have identified a dearth of digitally competent library personnel in academic libraries across Nigeria<sup>20</sup>. While there are significant efforts to increase the digital literacy competency of library personnel, the pace seems to be too slow compared to what is required to ensure that academic libraries compete favorably with other sources of information that information users may think of<sup>21</sup>.

The low level of cloud computing adoption in Nigerian academic libraries and the observed low level of digital literacy competency among libraries may be due to a lack of empirical evidence regarding their contribution to the quality of library services. This study, therefore, examines the correlation between the characteristics of cloud computing and the digital literacy competency of the library personnel on the quality of library services in federal universities in South West Nigeria.

## **1.2 Statement of the Problem**

Library service quality has long been a topic of interest to library personnel but it has become more significant with technological advancement which has opened up various sources of information to rival, or at times, even surpass what the library is capable of offering. Dimensions of service quality such as affect of service, information control, and library as place must therefore be rated high by library users. When this is the case, it means the library can meet its obligation of supporting the teaching, learning, and research activities in its parent organization. When this is not so, the library soon loses its perceived relevance and the support it enjoys from the parent institutions. In line with the widespread perception that the academic library does not have the level of service quality to meet the information needs of modern students and researchers, researchers have examined various factors that can contribute to service quality in academic libraries<sup>7,8</sup>. Researchers have examined the role of library management, librarians, parent institutions, and other factors in enhancing or hindering service quality in academic libraries<sup>6,7,8</sup>. However, few of these studies have examined the correlation between cloud computing, library personnel's digital literacy competency, and the quality of service in libraries in federal universities.

This study, therefore, aims to fill this knowledge gap by investigating the correlation between characteristics of cloud computing, digital literacy competency, and quality of services in academic libraries in federal universities in southwest Nigeria. Libraries can take advantage of the characteristics of cloud computing to get out of technology headaches such as hardware breakdown, software problems, and staff training deficiency and focus on collection building, patron services, and innovation. The review of related literatures also revealed that the digital literacy competency of library personnel is crucial to the successful adoption of cloud computing as these two factors correlate with service quality. Hence, the necessity of this study is to investigate the characteristics of cloud computing and digital literacy competency as correlates of service quality among library personnel in federal universities in South West Nigeria.

### **1.3 Aim and Objectives of the Study**

The study aims to investigate the influence of characteristics of cloud computing and digital literacy competency on the service quality among library personnel in federal universities in South West Nigeria. In order to achieve this, specific objectives are to:

- i. identify the level of service quality provided by library personnel in academic libraries in federal universities in southwest Nigeria.
- ii. identify the characteristics of cloud computing by library personnel in academic libraries in federal universities in southwest Nigeria.
- iii. identify the level of digital literacy competency possessed by library personnel in academic libraries in federal universities in southwest Nigeria.

- iv. examine the influence of characteristics of cloud computing on service quality among library personnel in academic libraries in federal universities in southwest Nigeria.
- v. determine the influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in southwest Nigeria.
- vi. ascertain the joint influence of characteristics of cloud computing and digital literacy competency on service quality among library personnel in academic libraries in federal universities in southwest Nigeria.
- vii. determine the moderating impact of rank/cadre on the influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in southwest Nigeria.

#### **1.4 Research Questions**

The following questions will guide the study:

1. What is the level of service quality provided by library personnel in academic libraries in federal universities in southwest Nigeria?
2. What is the characteristics of cloud computing by library personnel in academic libraries in federal universities and libraries in southwest Nigeria?
3. What is the level of digital literacy competency possessed by library personnel in academic libraries in federal universities in southwest Nigeria?

#### **1.5 Hypotheses**

The following hypotheses was tested at a 0.05 level of significance

H<sub>01</sub>: There will be no significant influence between characteristics of cloud computing and service quality of library personnel in academic libraries in federal universities in southwest Nigeria

H<sub>02</sub>: There will be no significant influence between digital literacy competency and service quality of library personnel in academic libraries in federal universities in southwest Nigeria

H<sub>03</sub>: There will be no significant joint influence of characteristics of cloud computing and digital literacy competency on service quality of library personnel in academic libraries in federal universities in southwest Nigeria.

H<sub>04</sub>: There will be no significant moderating impact of rank/cadre on the influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in southwest Nigeria.

## **1.6 Scope of the Study**

This study looks into the characteristics of cloud computing and digital literacy competency of library personnel as determinant of service quality in federal universities in South West Nigeria. The dependent variable is library service quality and it is measured by: library as place, information control, and affect of service. The first independent variable is characteristics of cloud computing by library personnel in academic libraries of federal universities in South West Nigeria and it will be measured with metrics such as relative advantage, compatibility, and complexity. The second independent variable is the digital literacy competency of library personnel which will be measured by information and data literacy, communication and collaboration, digital

content creation, Online safety, and problem-solving. The geographical scope of the study covers all academic library personnel working in federal universities in South West Nigeria. The professional library personnel in the libraries constituted the survey subject while the university library personnel were interviewed as part of the qualitative aspect of the study.

### **1.7 Significance of the Study**

The findings of this study are expected to be of relevance to the theory and practice of library and information science. It will also be of use to the general society. Specifically, the study will be of benefit to decision and policymakers, library personnel and researchers.

The findings of this research work would provide policy and decision makers with details of issues surrounding cloud computing adoption and its impact on library services. Lack of proper understanding is one of the issues surrounding the low use of cloud computing in academic libraries. The information to be provided in this study is expected to fill the knowledge gap among the policy and decision makers. This will help them make an informed decision about the characteristics of cloud computing and building the digital literacy competency of library personnel.

Library personnel are also expected to benefit from the findings of the study as it will provide them with the insight needed for effective implementation and efficient use of cloud computing. The use of cloud computing will depend greatly on the awareness of the range of cloud services available and the relevance of these services to library services. A study such as this which highlight the various form of cloud services available and their link to each service in the library is expected to be a great source of knowledge

for library personnel. It would also enable library personnel to realize that there is a need for them to acquire digital literacy competency necessary for the proper use of technology in the library. The library personnel can use these competencies to progress in their jobs and career development. With digital literacy competency, library personnel will be more equipped with the necessary skills needed for resource sharing, blogging, surfing the net, instant messaging, and social networking.

Most importantly, researchers and other academic library users stand to benefit from the study as they would be able to meet their information needs easily when library personnel can render quality service fulfilling the fourth law of Ranganathan which says, save the time of the user. Any research on the use of technology, the current one inclusive, is an attempt to promote effective and wider use of technology to render modern library services as demanded by information users. The effective services rendered by academic libraries would therefore enhance the quality of research and lessen the burden on researchers. Ultimately, the research focuses on an area that has not received adequate attention from scholars. There is a dearth of empirical studies, especially with a scope as wide as is being attempted in the current Nigeria. As a result, this study will fill a knowledge gap and advance the frontier of knowledge in the field of librarianship.

### **1.8. Limitation of the study**

In carrying out this study, the researcher was confronted by a number of constraints which could have possibly hindered the completion and success of the study.

In the first instance, there was scarcity of empirical findings and submission in extant to literature on the interactions among the variables of interest in the context of tertiary institutions in developing countries. Strigent efforts were thus exerted to explore the few

available literatures and draw inferences from studies in other contexts as precursors for this study.

The researcher was also confronted by lack of adequate fund to carry out the research. Much was needed to get the tangible and intangible resources needed, travelling, printing, engaging research assistants, data collection and analysis etc. To overcome this, the researcher sought for credit facilities to ease the challenge of funding.

Another important constraint encountered in the course of this study is the attitude of the library heads(UL) in federal universities in officially attesting to the conduct of the research by signing the attestation letter while some put the researcher through much scrutiny before being allowed to administer questionnaire. Similar to this, was the attitude of the librarians in completing and returning the questionnaire administered to them. The researcher also encountered difficulty in gaining the audience of the University librarians (UL) for interview session due to their busy schedule.

### **1.9. Operational Definition of Term**

**Service Quality:** is the extent to which the services provided by federal universities' library in South west Nigeria meet the expectations of library users

**Affect of Service:** this refers to the speed and ease at which information users can obtain library services in federal universities' library in South west Nigeria.

**Library as Place:** is the ambiance, comfort, and aesthetic qualities of the library (both physical and virtual) that make patrons wishes to stay longer in federal universities' library in South west Nigeria.

**Information Control:** is the availability of various information retrieval tools such as Oline Public Access Catalogue, Library Web Portal, Indexes and so on in federal universities' library in South west Nigeria

**Characteristics of Cloud Computing:** is the subjective evaluation of the usefulness, relevance and simplicity of using cloud computing services for information service provision by library personnel in academic libraries in federal universities in South West Nigeria,

**Relative advantage:** is the extent to which library personnel in academic libraries in federal universities in South West Nigeria perceive that subscribing to cloud services will be more cost-effective, efficient, and sustainable than investing in their infrastructures.

**Complexity:** is the perception of library personnel in academic libraries in federal universities in South west Nigeria regarding how easy it is to use cloud computing in rendering various library services.

**Compatibility:** is the perception of library personnel in academic libraries in federal universities in South west Nigeria about the relevance of cloud computing to their current and project mode of operations.

**Digital Literacy Competency:** is the ability of library personnel in academic libraries in federal universities in South west Nigeria to operate effectively in the digital library environment.

**Information and Data Literacy:** is the ability of library personnel in academic libraries in federal universities in South west Nigeria to expertly store, manage, and organize digital data, information, and contents.

***Communication and collaboration:*** are the abilities of library personnel in academic libraries in federal universities in South west Nigeria to interact, communicate and collaborate with other professionals using digital technologies.

***Digital Content Creation:*** is the ability of library personnel in academic libraries in federal universities in South west Nigeria to create and edit digital content, improve and integrate information and content into an existing body of knowledge with the full understanding of all relevant copyright laws.

***Online Safety:*** is the ability of library personnel in academic libraries in federal universities in South west Nigeria to protect devices, content, personal data, and privacy in digital environments and to maintain and promote healthy relationships in the digital space.

***Problem-solving:*** is the ability of library personnel in academic libraries in federal universities in South west Nigeria to identify information needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution

***University Librarian:*** is the officer responsible for the administration of university library.

***Library Personnel:*** These are human resources who can be professionals (librarians) or para-professionals (library officers) serving the library users in academic libraries in federal universities in South west Nigeria.

## **Endnotes**

- P., Khaola. *Perception of Library Service Quality, Satisfaction and Frequency of Use of Library Resources*, **Inkanyiso: Journal of Humanities and Social Sciences**, 7(1), 2015, 44-52–62.
- 2 A., Tella, & T. I., Oladeji. *Empirical Investigation on Impact of Koha on Library Services in Selected Academic Libraries in Nigeria*, **Annals of Library And Information Studies**, 64, 2017, 113–115.
  - 3 A., Ramezani. *A Meta-Analysis of Service Quality of Iranian University Libraries Based on the Libqual Model*, **Performance Measurement and Metrics**, 19(3), 2018, 186–202.
  - 4 K. K., Twum, A. A., Yalley, G. K. Q., Agyapong, & D., Ofori. *The Influence of Public University Library Service Quality and Library Brand Image on User Loyalty*, **International Review on Public and Nonprofit Marketing**, 18(2), 2021, 207-227.
  - 5 C. H., Wu, Y. H., Yuan, & S. B., Tsai. *Using the Dematel Model to Expose Core Causal Items of Libqual for Improving Library Service Quality: From the Perspective of Big Data*, **Soft Computing**, 24(8), 2020, 5729-5739.
  - 6 O. M., Momodu. *Academic Library in Nigeria: Yesterday, Today and Tomorrow*, **American Journal of Social Sciences**, 3(4), 2015, 115–119. [Http://Www.Openscienceonline.Com/Journal/Ajss](http://www.openscienceonline.com/journal/ajss).
  - 7 J. C., Fagan. *The Dimensions of Library Service Quality: A Confirmatory Factor Analysis of the Libqual+ Instrument*, **Library and Information Science Research**, 36(1), 2014, 36–48.
  - 8 A., Kumar, & P., Mahajan. *Library Performance Assessment of Service Quality through Libqual: The Case of Maharshi Dayanand University (Mdu), Rohtak (India)*, **Library Philosophy and Practice**, 2019.
  - 9 P. O., Olubiyo, & R. A., Awoyemi. *Automation of Academic Libraries in Nigeria: Issues and Practices*, **Library Philosophy and Practice**, 2021, 1–17.
  - 10 M., Sharma, R., Gupta, & P., Acharya. *Analysing the Adoption of Cloud Computing Service: A Systematic Literature Review*, **Global Knowledge, Memory and Communication**, 70(1–2), 2021, 114–153.
  - 11 J. P., Srivastava, & V. K., Verma. *Cloud Computing in Libraries: Its Needs, Applications, Issues and Best Practices*, 4th International Symposium on Emerging Trends and Technologies in Libraries and Information Services, ETTLIS 2015 Proceedings, 2015, 33–38.
  - 12 A., Tella, S. C., Ukwoma, & I. K., Adeniyi. *A Two Models Modification for Determining Cloud Computing Adoption for Web-Based Services in Academic*

- Libraries in Nigeria*, **Journal of Academic Library Personnel Hip**, 46(6), 2020, 102255. <https://doi.org/10.1016/J.Acalib.2020.102255>.
- 13 N. A., Salam, & S., Ali. *Determining Factors of Cloud Computing Adoption: A Study of Indonesian Local Government Employees*, **Journal of Accounting and Investment**, 21(2), 2020.
  - 14 A., Omehia, E., Okwu, & O., Nsirim. *Library Personnel' ICT Competencies and Utilization of Emerging Technologies in Academic Libraries in Rivers State, Nigeria Media Misinformation and Information Management in the Era of New Technologies View Project*, **Library Philosophy And Practice** <https://digitalcommons.unl.edu/libphilprac>.
  - 15 İ. Reisoğlu & A. Çebi, *How Can The Digital Competences of Pre-Service Teachers Be Developed? Examining A Case Study Through the Lens of Digcomp and Digcompedu*, **Computers And Education** 156, 2020.
  - 16 D. Trivedi, A. Bhatt, & S. S. Dineshbhai, *Service Quality Dimensions and Quality View Point of University Library Personnel In Gujarat*, **Library Philosophy And Practice** 2021.
  - 17 A. J. Aiyebilehin, *Awareness and Use of Cloud Computing Services and Technologies by Library Personnel in Selected Universities in Edo State*, **International Journal of Knowledge Content Development & Technology** 10, No. 3, 2020: 7–20, <http://dx.doi.org/10.5865/ijkt.2020.10.3.007>.
  - 18 O. O. Fagbola, A. E. Smart, & B. O. Oluwaseun, *Application of Cloud Computing Technologies in Academic Library Management*, **Research Anthology on Collaboration, Digital Services, And Resource Management for the Sustainability of Libraries**, 2021: 704–728;
  - 19 E. E. Baro, O.G. Obaro, & E. D. Aduba, *an Assessment of Digital Literacy Skills and Knowledge-Based Competencies Among Library Personnel Working in University Libraries in Africa*, **Digital Library Perspectives** 35, No. 3–4, 2019: 172–192.
  - 20 A. P. Joel & F. L. Ibrahim, *Digital Competencies Needed by Library Personnel and Information Professionals for Knowledge Management of 21st Century University Libraries In Borno State*, **Library Philosophy And Practice** 2021.
  - 21 N. Edewor, *Capacity Building Efforts to Develop Digital Innovation Competencies Among Library Personnel in Nigeria*, **Journal Of Library Administration** 60, No. 3 2020: 316–330, <https://doi.org/10.1080/01930826.2020.1727281>.

## **Chapter Two**

### **Literature Review**

This chapter reviews related studies and literature focused on the subject of this study which is concerned with how the adoption of cloud computing and digital competency of library personnel determine the quality of library services in Nigerian federal universities.

The chapter is organized under the following subheading;

#### **2.1 Conceptual Review**

2.1.1 Overview of Service Quality

2.1.2 Perceived Characteristics of Cloud Computing

2.1.3 Digital Literacy Competency

#### **2.2 Theoretical Framework**

2.2.1 LibQual+

2.2.2 Innovation Diffusion Theory

2.2.3 Digital Literacy Competency Framework

#### **2.3 Review of Empirical Studies**

2.3.1 Cloud Computing and Service Quality

2.3.2 Digital Literacy Competency and Service Quality

#### **2.4 Conceptual Model**

#### **2.5 Summary of Gaps in Literature Reviewed**

#### **Endnotes**

## **2.1 Conceptual Review**

### **2.1.1 Overview of Service Quality**

The concept of service generally refers to the act of helping or assisting others, often in a professional or formal capacity. There are several typologies of services that have been developed to help categorize and understand different types of services. The most basic way of categorizing service is to look at the nature of Service. This typology distinguishes between different types of services based on the nature of the service itself. It includes categories such as physical goods, people processing services such as fashion, medical treatments, and possession processing services such as car repairs, house cleaning, and information processing services such as librarianship, education, and consultancy among others.

Services are also categorized by the degree of tangibility. This typology distinguishes between services that are more tangible and those that are more intangible. Tangible services include things like restaurants and hotels, where customers can physically interact with the service, while intangible services include things like consulting and counseling<sup>1</sup>. Customer relationship services are another type of services that distinguishes between services that involve ongoing relationships with customers, such as financial services and healthcare, and those that are more transactional in nature, such as retail and hospitality.

Another way of looking at services is by evaluating the degree of customization. This typology distinguishes between services that are highly customized to each customer, such as personal training and consulting, and those that are more standardized, such as fast food or mass transit. By understanding the different typologies of services,

organizations can better tailor their services to meet the needs and expectations of their customers, and develop strategies to compete in the marketplace. Irrespective of the type of service rendered, the quality of such service is the determining factor in its continued acceptability among the targeted consumers.

There are several definitions of service quality, as it can be understood and evaluated from various perspectives. One of the most popular defined service quality as the degree of excellence achieved by a service and which meets or exceeds customer expectations<sup>2</sup>. Service quality is also defined as the extent to which a service meets customers' needs or requirements. These definitions shows that service quality is focused on how well a service meet the expectation of customers. This is shown in another definition which says that “Service quality is the customer's overall impression of the relative inferiority/superiority of the organization and its services<sup>3</sup>. These definitions highlight the importance of meeting or exceeding customer expectations, delivering a service that meets the customer's needs, and creating a positive overall impression of the organization and its services. By focusing on these elements, companies can improve their service quality and create a more satisfying customer experience.

Service can take many forms, from providing practical help and support with a specific task or need, to offering advice or expertise on a particular subject<sup>4</sup>. There are many different types of service that can be provided, depending on the context and the needs of the person or organization being served. Some common types of services include customer service, support services, public services, community services, and emergency services. All of these types of services meet a particular need for the people to whom they are directed.

Customer services refer to the assistance and support provided to customers or clients by a business or organization. This can include answering basic questions, providing information and guidance, and resolving issues or concerns. Extension of customer services are support services which are services that help individuals or organizations to function more effectively or efficiently. It is often meant to help those who have acquired some complex equipment or renders complex services to make effective of the machinery and provide seamless services. This can include services such as IT support, financial management, and logistics.

Public services are more general and varied. These are services provided by the government to meet the needs of the public. Examples of public services include education, healthcare, and public transportation. However, all of the services are also rendered by private organizations which means that each should just be considered on its own. However, because it is mandatory for governments to provide all these services they are usually referred to as public services<sup>5</sup>. Public services also include emergency services. These are services that are available to respond to urgent or critical situations, such as fires, accidents, and medical emergencies. Examples of emergency services include fire departments, ambulances, and hospitals<sup>6</sup>. Another form of government service that can also be rendered by individuals is community service. These are services that are provided to support the needs and interests of a particular community. This can include services such as libraries, parks, and community centers.

There are also services rendered by the citizen which are usually rendered not for profit but from an altruistic motivation. These include volunteer services. Volunteer services are services that are provided by volunteers, who give their time and expertise to help others

without receiving payment. Examples of volunteer services include disaster relief, tutoring, and mentoring. In a business context, service often refers to the actions and interactions that take place between an organization and its customers or clients. This can include everything from answering customer questions and providing assistance with products or services, to ensuring a positive and satisfying overall experience for the customer<sup>7</sup>. One unique type of services that transverses all other types of services is library services.

Library services refer to the various ways in which libraries help their users access information and knowledge. These services can include lending books and other materials, providing access to computers and the internet, offering research assistance, and hosting educational and cultural events. Libraries offer a wide range of services to meet the needs of their users. These services may be provided in person, online, or through a combination of both<sup>8</sup>. Many libraries also offer specialized services, such as support for people with disabilities, assistance with genealogical research, or access to unique and rare collections.

Overall, library services are focused on providing users with the resources and support they need to learn, grow, and thrive. These services play a vital role in supporting education, literacy, and personal and professional development<sup>9</sup>. Academic libraries play a crucial role in supporting the education and research missions of universities. These libraries provide a range of services to help students, faculty, and staff access the information and resources they need to succeed. Like any other service provider, library services are targeted at meeting particular needs of the clients and it can only be regarded as quality when it achieves this purpose.

Service quality is the perceived value of a service from the perspective of the customer. It is determined by how well the service meets or exceeds the customer's expectations. Service quality is important because it can affect a customer's satisfaction with a product or service, and ultimately, the customer's loyalty to the brand. Companies that provide high-quality service are more likely to retain customers and attract new ones through positive word-of-mouth. The concept of service quality evaluation has its roots in the field of quality management, which focuses on ensuring that products and services meet or exceed customer expectations. One of the early pioneers of quality management was the American engineer and statistician, W. Edwards Deming, who developed a set of principles for improving the quality of products and services in the manufacturing industry. Deming's work laid the foundation for many of the techniques and tools that are used to evaluate and improve service quality today, such as customer satisfaction surveys and performance metrics.

Service quality is influenced by many factors, including the competence and friendliness of the company's employees, the reliability and consistency of the services provided, the ease of access to the services, and the company's responsiveness to customer needs and concerns. To maintain high levels of service quality, organizations must constantly monitor and improve their services. This can be achieved through regular customer feedback, staff training, process improvement, and the use of technology to streamline service delivery. Ultimately, providing high-quality services can lead to increased customer satisfaction, loyalty, and repeat business, which can be beneficial for the long-term success and growth of a company.

Service quality is an important consideration for libraries because it directly impacts the user experience and the overall satisfaction of library patrons. Libraries can improve their service quality by focusing on several key areas, such as providing access to a wide range of materials and resources, offering knowledgeable and helpful staff, and maintaining a clean and inviting physical space. Additionally, libraries can use customer feedback and performance metrics to identify areas for improvement and make changes to better meet the needs of their patrons. By providing high-quality service, libraries can foster a positive relationship with their patrons and support their mission of promoting literacy and learning.

There are several ways that libraries can measure the service quality they provide to patrons. One approach is to use customer satisfaction surveys, which can provide valuable feedback on the quality of services and help libraries identify areas for improvement. Surveys can be administered in person, by phone, or online, and can include questions about the library's collections, staff, facilities, and services. Another way to measure service quality is to track performance metrics, such as the number of patrons served, the number of materials borrowed, and the length of time it takes to respond to customer inquiries. By regularly monitoring these metrics, libraries can track their performance over time and make adjustments to improve service quality.

There are several factors to consider when measuring the quality of a library's services. One important factor is the relevance and adequacy of the library's collections (physical & electronics), including the availability of books, journals, and other materials that meet the needs of the library's patrons. Another factor is the knowledge and helpfulness of the library's staff, as well as the availability of staff to assist patrons with their inquiries and

needs. The cleanliness, comfort, and accessibility of the library's physical space are also important factors to consider, as is the overall convenience of the library's services and resources. By considering these factors and using tools such as customer satisfaction surveys and performance metrics, libraries can effectively measure and improve the quality of their services.

The competitive environment in which service organizations such as libraries operate and the perennial human need to do better has necessitated that proper attention is paid to the quality of services they offer to their clientele. The contemporary service consumers are spoilt for choice with many service providers offering similar or related services competing for their attention. For any business enterprise to attain success, no matter how success is defined, it is important to learn more about its customers and how their needs are changing and evolving. There may be new services that need to be added, and existing services need to be upgraded and improved to take advantage of the potential of technology. The information needs of the users will be a lot clearer with proper engagement which allows academic libraries to listen to information users and encourage them to share their experiences with the library<sup>10</sup>.

Engaging information users by listening to their voices will make sure that library management knows what each user group thinks about the library and the value it provides, rather than making assumptions and inferences based on the library management's assumptions and beliefs. Service quality assessment is therefore the first step in retaining users in today's competitive environment. When library users can choose from a variety of alternative channels of information delivery, many of which are more convenient and can compete on cost, libraries need to re-examine the range and quality of

services they provide and develop systems for consultation and cooperation with their user needs and user expectations to the highest degree<sup>11</sup>.

The traditional approach of evaluating the quality of libraries based on the size of their collections is no longer relevant<sup>12</sup>. Apparently, several other scholars share this opinion as there have been many metrics that have been introduced over the years to measure the overall quality of library services or to measure particular individual services. One of such metrics is the American Research Libraries (ARL) Statistics. This measurement instrument is a set of metrics to evaluate library collections (volume of print resources, subscription databases, facilities) and the size of funds available to libraries. This tool is regarded as one of the best performing and consistently adopted by libraries in the evaluation of collection and services<sup>13</sup>.

The ARL tool was developed due to the recognition of the need to have empirical evidence about the state of the library collection and library finance. Understanding whether the collection or finance is on the rise or in decline can serve as solid measures of value. A strong case for the library's continued importance can be made by pointing to its expanding collection and greater financial resources. The growing size of the library's collection is indicative of its efforts to accommodate the growing needs of its patrons for more and better access to information. Similarly, increased financing from parent organizations or receiving grants from external donors can be used to demonstrate that key stakeholders value the library and its services. It used to be that library personnel and other library stakeholders were the ones to judge how well libraries were serving their communities<sup>14</sup>. However, because of the changing information environment and the

diversity among library users, library personnel are shifting to users-studies for evaluation of library service quality.

Library patrons are now considered the most reliable arbiters of whether or not library services are up to grade. This is based on the belief that library collections and services were intended for a certain audience and that only those services that cater to that audience can be judged to be of sufficient quality. After all, a large library building housing a million books has no relevance if the users cannot find what they need in it<sup>15</sup>. Therefore, it is essential for academic libraries to know their core goals so that they can provide services that students and faculty want and need. This includes serving as a place for learning, research, and study. This reality has led to the development of various models and frameworks that can allow library users of all categories to evaluate the standard of library services and collections<sup>16,17</sup>.

Since services are intangible, it is impossible to quantify or illustrate them in a specific way, which is why measuring library services is not a simple affair<sup>18</sup>. Likewise, it is not easy to settle on what constitutes "best practices" in library service. Since services cannot be stored indefinitely in advance of their actual usage, performance is affected to some degree by the level of demand. Last but not the least, as customers play an active role in the service's delivery, they have a say in shaping the service's overall quality. Therefore, service quality may differ based on individual preferences. Total quality management, accreditation, benchmarking, library standards, SERVQUAL, SERVPERF, and LibQUAL are just some of the tools and techniques that have been tried by libraries and other service providers and found as being helpful in evaluating and improving library service quality<sup>15</sup>.

Excellence, value, conformity to standards, and meeting or exceeding expectations are the four characteristics of service quality proposed by Herson and Altman<sup>19</sup>.

From this study, an academic library service quality framework was created with the goal of exceeding patrons' expectations. The core idea of this framework, which has had an impact on succeeding library assessment models, is that library patrons are the most qualified to evaluate the quality of library services. However, the acceptance of library patron feedback as a reliable indicator of service quality was a change brought about by the commercial sector. The idea to make library patron the judge of library services quality came from the expectation gap.

The expectations gap was first found by academics studying consumer behaviour who were studying how people feel about various consumer services. Experts in consumer behaviour coined the phrase "expectations gap" to characterize the space between customers' actual experience and the provider's promises. Many businesses are blind to this dichotomy between what they promise and the actual experience by the customer, and as a result, they are losing a sizable customer base. This inspired the creation of the Gap Model, often known as the 5 Gaps Model of Service Quality. This is a technique for investigating customer complaints and issues with a company. For businesses to develop and thrive, they must ensure their consumers are happy with the products and services they provide. This model can assist measure and boost customer satisfaction. The Five-Gap Theory of Service Quality (also known as the SERVQUAL Gaps Model or the Five-Gaps Model)<sup>20</sup>.

When it comes to customer satisfaction, the first gap in the Gap Model of Service Quality is the knowledge gap, which reflects a lack of understanding on the part of management

about what exactly customers want. That is to say, upper management frequently fails to meet customer expectations. Ineffective data collection and processing are often cited as possible causes of this discrepancy. This void may occur, for instance, if management does not adequately collect, analyse, and act upon feedback and suggestions from front-line workers, field personnel, and customer surveys. This gap is sometimes called a "listening" gap rather than an information gap in the era of big data, when customers have easy access to rating platforms and a tendency to share their experiences. In other words, it's not hard to get hold of the data. The biggest challenge is figuring out how to prioritize information, understand it, and then act on it<sup>21</sup>.

The SERVQUAL Model was created and introduced in 1988 by three American marketing experts: Valarie Zeithaml, A. Parasuraman, and Leonard Berry. It was designed as a tool to keep track of and analyze how content an organisation's customers are. The researchers developed a scale called Service Quality (SERVQUAL) to gauge how satisfied customers are with a company's level of service. The tool had a total of 22 statements that may be categorized into the following themes: tangible service; reliability; responsiveness; assurance; empathy<sup>22</sup>. This tool became popular and it was adopted and adapted by many organizations including libraries. However, with the passage of time, it became obvious that the SERVQUAL was inadequate in measuring the quality of library services. This led to the development of library-specific tools such as LibQual<sup>23</sup>.

LibQual, an evaluation framework for library services, was created by Academic and Research Libraries (ARL) in collaboration with Texas A & M University Libraries in response to the SERVQUAL Model<sup>9</sup>. Since LibQual's inception, three user-rated criteria of service quality have been widely used to assess public library performance. Three of

these factors are: affect of service (AS), Information control (IC) and Library as Place (LP). In this way, library patrons can give their honest opinions about the quality of the library's services and the expertise of the librarians. A scholar argued that it is difficult to quantify the quality of library services since patrons would assign ratings based on their own preferences. Customers with low expectations are more likely to give positive ratings to library services, even if they are only adequate, while users with very high expectations are more likely to give negative ratings, even if the library is quite good compared to other libraries. Therefore, it is up to library management to control users' expectations and opinions. One way to do this is to analyze the users' ratings for each of the three criteria typically used to evaluate library services. Information availability and access to it is a natural starting point<sup>16</sup>.

Libraries are vital community hubs, and library users' access to information is a critical issue. It was found that having easy access to relevant information was crucial to making good use of digital libraries and archives<sup>24</sup>. This is especially true of Africa where many students may not have their own computer devices or access to subscription databases which contain the highest quality of information resources in all formats. The American Library Association also argued that all people, but especially the economically poor who may face barriers to information due to their economic status, need access to library and information resources, services, and technologies. Whatever the technology, format, or mode of delivery, all library users should have easy, equal, and unbiased access to all library-provided information resources<sup>25</sup>. Despite this ideal from global professional bodies, the reality has shown that library users, especially in developing countries, often

face difficulties in accessing library information resources, especially electronic information resources, which are being introduced to improve access to information.

Library patrons in Pakistan have expressed dissatisfaction with how technology is being used in academic libraries. This is due to a lack of sophisticated information technology resources within academic libraries. It is impossible to provide enough access to computers and the internet in Pakistan's public libraries to meet the demands of the country's large and growing population. Furthermore, there are limited options for library workers to receive training on the ICT equipment provided by university administrations<sup>26</sup>.

Thus, most library personnel lack the expertise to guide library patrons via intricate information systems. It was similarly noted that despite investments in technology like the construction of institutional repositories to gather and organize electronic information resources, academic libraries in Lesotho are not doing enough to give access to information resources<sup>27</sup>. In the same vein, academic libraries in Nigeria are working to increase patrons' access to scholarly materials. However, they are facing several challenges in providing the best quality services to the users. Poor internet, low bandwidth, inadequate computer systems, and intermittent power supply are just a few of the persistent problems that are stymieing the efforts. However, the affect of service can either improve or worsen accessibility<sup>28</sup>.

The LibQual model includes a concept called "affect of service," which describes the emotions or feelings aroused by the library services, especially in the patrons. In general, a service that is well-designed, reliable, and provides a valuable or necessary function can have a positive impact on the individuals or organizations that use it. On the other hand, a

poorly-designed or faulty service can have a negative effect, causing inconvenience, frustration, or other problems for those who rely on it. The impact or effect of library services can vary depending on the specific services provided and how they are used by the community. In general, library services can have a positive impact by providing access to information and resources that support education, research, and personal growth. For example, a library may offer books, periodicals, and online databases that allow people to learn about a wide range of topics. Library services can also provide access to computers and other technology, as well as programs and events that promote learning and community engagement.

On the other hand, a library that is not well-supported or does not offer relevant and useful services may have a negative impact on the community it serves. Without access to adequate resources or support, a library may not be able to effectively fulfill its role as a center of knowledge and learning. In this sense, a library can instill fulfillment, frustration and apathy. From the previous analysis, it is easy to see that the factors germane to the affect of library services include the library personnel, library collection and library facilities. Another factor to consider when measuring the quality of a library's services is the knowledge and helpfulness of its staff. The staff of a library play a critical role in supporting the mission of the library and providing a positive user experience for patrons. They are often the first point of contact for patrons who have questions or need assistance, and they play a crucial role in helping patrons access the library's collections and resources. In order to effectively measure the quality of a library's staff, it is important to assess the knowledge and expertise of the staff, as well as their willingness and ability to assist patrons with their inquiries.

Library personnel are the foremost determinant of affect of library services. The library personnels' mentality toward creating a comfortable and inviting library environment. Users of libraries have a right to expect staff to be consistently courteous and instill confidence in users<sup>16</sup>. Several scholars have stressed the importance of library personnels' friendliness, warmness, and accessibility to library patrons<sup>29,30,31</sup>. It is expected that the library's front desk staff, and indeed those who work behind the scene such as cataloguers, indexers, and acquisition librarians, will be welcoming and helpful to the numerous visitors who come there in search of knowledge, just as it is in the case of any other service provider or corporate organization that deals with the public. This is important so that the staff does not discourage users, especially those with library anxiety, from visiting the library.

Library anxiety is the psychological and emotional discomfort experienced by some students whenever they consider accessing an academic library<sup>32</sup>. This is especially true for students from poor countries who enter tertiary institutions with little or no experience using the library. It is understandable that enormous academic libraries would strike fear into the hearts of fresh undergraduates even if they came from countries with well-developed school library systems. The long and seemingly endless rows of bookshelves and arrays of computer workstations can be intimidating to new students. However, that is not all.

Affect of service is also concerned about any act, attitude, or communication of library personnel which can either put patrons at ease or make them uncomfortable. Some undergraduates, in their wonder at being surrounded by so much information and in an atmosphere where everyone appears educated, may feel as though they are the only ones

who do not know where to go or what to look for. In most cases, the library personnel do not help matters by appearing both busy and threatening<sup>33</sup>. It has been claimed by many library patrons that they are hesitant to ask for assistance from library personnel because they fear being judged as incompetent or stupid for not knowing how to navigate the library's vast collection of books, journals, and databases to get the information they need. The inevitable outcome would be that these students would put off going to the library (procrastination). It is not surprising that they have abandoned the library in favor of the anonymity of the internet, where there is no person to evaluate them, given the proliferation of search engines and free information resources online<sup>34</sup>. The availability of other sources of information also demands that academic libraries are rated high on the dimension of information control.

Information control refers to the degree to which information users can obtain the information resources needed from the library. It measures how users want to interact with the modern library and include scope, timeliness and convenience, ease of navigation, modern equipment, and self-reliance. Some of the measures of information control in a modern academic library include; making electronic resources remotely accessible to information users irrespective of their location, creating a library Web site which enables users to locate information on their own; provision of well processed and organized print and electronic information resources. It also includes the provision of modern facilities to access information resources, easy-to-use access tools that allow users to find information without assistance, and making. Specifically, the quality of library collection as represented by information control is judged based on the scope of the collection, ease of use, ease of navigating both the physical and virtual library space,

how fast the information can be retrieved, available infrastructure such as computer systems, printers, internet connection, and electricity supply among others. Available literature has revealed diverse perceptions of information control by library users from across Nigeria.

According to research conducted in Nigeria, it is possible for library patrons to be satisfied with certain of the library's facilities while expressing dissatisfaction with the library's information resources and services. This can occur when the library lacks the necessary relevant information resources needed by the patrons<sup>35</sup>. Information control means that academic libraries have a wide range of relevant information resources and they can easily guide users to where they can obtain the information resources. The ability to achieve this is considered quality library services while the inability to achieve this can be seen as a poor level of information control. Academic libraries in developing countries seems to have failed in the area of information control to the disadvantage of their patrons.

It was reported that library patrons in academic libraries often lack confidence of their information retrieval abilities<sup>29</sup>. They are also mostly unfamiliar with electronic resources and face difficulty in educating themselves about library services and resources<sup>36</sup>. As a result, one of the key services provided by academic libraries is access to a wide range of materials, including books, journals, and other print and digital resources. These collections are carefully curated to support the curricula and research needs of the institution and are often supplemented by interlibrary loan services that allow users to access materials from other libraries.

In addition to providing access to materials, academic libraries also offer a range of support services to help users make the most of these resources. This can include research assistance, where trained staff help users find and evaluate sources, as well as instruction in information literacy skills such as database searching and citation management. Another important service provided by academic libraries is access to technology and digital resources. Many academic libraries offer a range of computers and other technology for use by students and faculty, as well as specialized software and other tools for research and study. Libraries may also offer online resources such as electronic journals and databases, as well as support for remote access and digital scholarship. The main objective behind these services is such that both the library and its patrons are able to control the available information for easy retrieval.

Library as a place is as important as affect of service and information control in measuring library service quality. Libraries are evaluated based on the experience patrons have while using the physical and digital space in the library. The academic library, like any other public space, should have an inviting atmosphere that makes people feel at home. The physical and digital library space itself should be designed to be inviting, accessible, and accommodating for a wide range of purposes, from study to relaxation. This is confirmed by a study which reported that some students have a preference for a specific library over others, depending on factors like proximity, desk size, and lighting. While some patrons appreciate the convenience of a newer library with plenty of outlets for their devices, others find that the quiet and calm of a more historic structure is more conducive to their study. While some students benefit from studying with friends, others learn best when left to their own devices<sup>37</sup>.

Similarly, Korean researchers also reported that library user's satisfaction with library services is affected by factors such as the available facilities and how easy it is to access and navigate the website and building<sup>38</sup>. A group of scholars identified access and opening times, consultation service, study rooms and additional service factors that influence user's satisfaction with library services. There are several other studies that have also emphasized the role of library as a place. However, theory do not often meet practice as reports from various libraries, especially in developing countries have shown that the library environment( physical & digital) is not always conducive<sup>39</sup>.

Researchers also reported that students at the Rivers State university library often find it difficult to secure seats during examinations which means that the library is often filled to the brim<sup>40</sup>. In the same vein, scholars from the United Kingdom also reported that departmental libraries in Cambridge University often have to create 'silent' space due to excessive noise from library users in the main reading room. It was found that some students preferred a noisy reading room while others would want to read in a quiet place. This further shows the subjective nature of service quality evaluation<sup>41</sup>.

In addition to these core services, many academic libraries also host events and activities that support the intellectual and cultural life of the institution. These can include book clubs, film screenings, workshops, and other programs that provide opportunities for learning and engagement outside of the classroom. Overall, academic libraries play a vital role in supporting the educational and research missions of their institutions. Through the services they provide, they help students, faculty, and staff access the information and resources they need to succeed. Overall, the concept of service is focused on putting the needs and interests of others first, and providing value and benefit to those

who are being served. It is a key aspect of many businesses and organizations, and is often a central part of their mission and purpose.

Measuring the quality of a library's services is an important aspect of ensuring that the library is meeting the needs of its patrons and fulfilling its mission. There are several key factors to consider when assessing the quality of a library's services, including the relevance and adequacy of the library's collections, the knowledge and helpfulness of its staff, and the cleanliness and comfort of its physical space. One important factor to consider when measuring the quality of a library's services is the relevance and adequacy of its collections. Libraries are repositories of knowledge and information, and it is essential that they provide access to a wide range of materials and resources that meet the needs of their patrons. This includes books, journals, and other print materials, as well as digital resources such as e-books, databases, and online tools. In order to effectively measure the quality of a library's collections, it is important to assess the availability and accessibility of these materials, as well as the relevance of the collections to the needs of the library's patrons.

The physical space of the library is another important factor to consider when evaluating its quality. A library's facilities should be clean, comfortable, and accessible to patrons of all abilities. The library should be well-lit and well-ventilated, with plenty of seating and workspace for patrons to use. The library's physical space should also be well-organized, with clear signage and easy-to-navigate collections, to enable patrons to easily find the materials and resources they need.

### **2.1.2 Characteristics of Cloud Computing**

Cloud computing is a type of computing that involves delivering computing services, such as storage, networking, and computing power, over the internet. This allows users to access and use these services on demand, without the need to manage and maintain the underlying infrastructure. One of the most rapidly expanding technologies of the 21st century, cloud computing offers numerous advantages but is not without its share of difficulties<sup>42</sup>. A variety of authors have attempted to define "the cloud" from their own unique vantage points, but ultimately settled on the same core ideas. "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources such as networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort and or service provider interaction<sup>43</sup>. The keywords in this definition include 'ubiquity' and 'on-demand'.

The introduction of cloud computing was a major turning point in the history of information technology. It has been crucial in meeting the growing needs for space and facilities. Its ubiquity is seen in that fact that, being online, subscribers or users can access their data and information anywhere. Resources and tools needed for work, learning, interaction or leisure are literally at the fingertips of individuals who choose to take advantage. That is why the first definition presented in this study include 'on-demand'. The use of on-demand is an acknowledgement of the fact that, while cloud computing is available everywhere, you have to subscribe, register or sign up in order to enjoy the services. Cloud's ability to make available resources like hardware and software through a network is its most remarkable feature. In cloud computing, you can find many

resources that are available on a pay-as-you-go basis. There are also other definitions for the concept of cloud computing<sup>44</sup>.

Cloud computing was defined in a study as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources such as networks, servers, storage, applications, and services that can be rapidly provided and utilized with minimal management effort or service provider interaction<sup>45</sup>. Furthermore, the United States' National Institute of Standards and Technology (NIST) defines "cloud computing as a technology that serves as a paradigm for gaining quick, easy, and low-effort access to a wide variety of supplier-managed computer resources such as networks, servers, data files, software, and services across a shared network. In addition, the organization outlined five essential features of cloud computing. These features set the systems apart from other forms of information and communication technology. These features include; free network access, self-service on demand, resource sharing (location independence), measurable service (payment upon delivery), and scalability which deals with the supply and release of resources in enough quantity and as needed by the consumer<sup>46</sup>. When needed, customers can access cloud computing services on their own, without the involvement of a service provider. All computing services are expected to be completely on-demand, so that they can adapt to any situation. This means that a client should not be forced to pay for service not utilized or needed.

Another feature is widespread network accessibility: This demands that any user on the network with the right set of tools such as laptops, desktops, smartphones, etc. can access cloud-based resources irrespective of where they are at a particular point in time. One of the most alluring aspects of cloud computing is the ability to scale computing services,

and one way this is accomplished is through the pooling of available resources. Storage, memory, processing power, and network throughput are only some of the resources whose use informs the specifications.

Fast elasticity is achieved through resource allocation that can shift spontaneously. Demand must be able to fluctuate widely without causing interruptions in service or a drop in quality. Cloud services providers often have enormous computing powers which they can afford to keep on stand as some sort of investment. Organizations, especially small or cash strapped ones like academic libraries are often not buoyant enough to invest in such amount storage space. With the use of cloud computing, they can pay for only the storage they currently need and take advantage of the scalability of cloud services when there is a need for expansion in their storage or server capacity. Services in the cloud are evaluated with the use of a utility model, which allows for accurate assessment of their quality. Both the service provider and the client can track costs in relation to usage of various resources with the help of this metric.

The National Institute of Standards and Technology (NIST) has a definition of cloud computing. Under this definition, the cloud model ensures that services are always accessible. It is characterized by four deployment models (private cloud, community cloud, public cloud, and hybrid cloud), each of which governs one or more of its five fundamental properties namely; self-service on demand; pooling resources; measurability of service; quick elasticity<sup>47</sup>. Cloud technology was also defined as "a basic concept which represent the future aspiration of information and communication technology".

Yet, the complexity of cloud computing stems from the fact that there are many different kinds of cloud technologies and many different sizes at which they can be deployed<sup>69</sup>.

Adaptive information and communication networks create networked virtual ICT items via a unique user interface and a suite of networking applications built into the underlying system. These objects, also known as network virtual sites, are a transient part of the open, adaptable, and dynamic architecture of information and communication networks which, because to its design and duration, is well-suited to the needs of its user (individual or collective) and the context in which the user operates.

Another author defines cloud technology as a collection of methodologies, tools, and procedures used to gather, organize, store, and process on remote servers, transmit over the network, and submit through a client software. The term cloud technologies also refers to a subset of ICTs used in various fields including education. While discussing educational tools, ICT education is a subset. Thus, "cloud learning technologies" are cloud-based ICT education programs. In addition, as defined in another study, "cloud services" are those that allow users to have networked access to a scalable and flexible pool of dispersed physical or virtual resources such as software, storage, computation, and computing capabilities that are managed on demand<sup>48</sup>. According to scholars in the field of education, the term "cloud-oriented environment of a higher education institution" refers to the setting in which the educational and scientific process participants have constructed a virtualized computer-technological infrastructure with the intent of putting computing power to use in the process of teaching and learning as well as the administration of the educational system. Cloud services should be used to provide methods for generating and supplying educational services as well as to make available to users' electronic educational resources that make up significant content of a cloud-oriented environment<sup>49</sup>.

Overall, these definitions agree that cloud computing involves the delivery of computing services over the internet, and that it enables users to access and use these services on demand. It is typically provided by specialized companies, and offers benefits such as cost savings, flexibility, and scalability. Cloud computing services are typically provided by specialized companies, known as cloud providers, which operate large data centers and offer access to their computing resources to customers on a pay-per-use basis. This allows users to access and use the services they need without having to invest in their own hardware and infrastructure.

Cloud computing has improved the service delivery of libraries through increased computing competency, the provision of enormous storage capabilities, global information accessibility, and a significant reduction in the cost of incurring the ICT facilities, and this trend is shared by library personnel. Cloud computing has many appealing features, but one of the most appealing is its low cost. Likewise, by removing the burden of purchasing and maintaining expensive hardware and software, cloud computing frees up institutions like academic libraries to focus on providing their patrons with high-quality information services rather than on data management<sup>50</sup>. That is why it is important to stress the need of moving to the cloud.

Cloud computing has become increasingly popular in recent years, as it offers a number of benefits over traditional computing models. These benefits include cost savings, flexibility, scalability, and the ability to access services from anywhere with an internet connection. Overall, cloud computing is a key enabler of digital transformation, allowing organizations and individuals to access and use computing resources in new and powerful

ways. It has the potential to drive innovation and enable new forms of collaboration and communication.

Cloud computing is a type of computing that involves delivering computing services, such as storage, networking, and computing power, over the internet. This allows users to access and use these services on demand, without the need to manage and maintain the underlying infrastructure. Cloud computing services are typically provided by specialized companies, known as cloud providers that operate large data centers and offer access to their computing resources to customers on a pay-per-use basis. This allows users to access and use the services they need without having to invest in their own hardware and infrastructure. Cloud computing has become increasingly popular in recent years, as it offers a number of benefits over traditional computing models. These benefits include cost savings, flexibility, scalability, and the ability to access services from anywhere with an internet connection<sup>70</sup>.

One of the key benefits of cloud computing is the ability to reduce capital expenditures by shifting from a model of owning and maintaining hardware and infrastructure to one of accessing and using computing resources on demand.

Instead of investing in their own data centers and servers, organizations can access the computing power they need from the cloud, paying only for the resources they use. This can save money and reduce the need for specialized IT staff to manage and maintain the infrastructure. Another benefit of cloud computing is flexibility. With the ability to access and use computing resources on demand, organizations can quickly and easily scale up or down as their needs change. This allows them to respond to changing business conditions and opportunities without the need to invest in additional hardware or infrastructure.

Cloud computing also enables organizations to access and use advanced technology and capabilities without the need to develop and maintain them in-house. This can include access to machine learning algorithms, artificial intelligence, and other technologies that can drive innovation and unlock new business opportunities. In addition, cloud computing allows users to access services from anywhere with an internet connection. This enables remote work and collaboration, as well as the ability to access services from mobile devices. Overall, cloud computing offers a range of benefits that are driving its increasing adoption across a wide range of industries. By providing access to advanced computing resources on demand, it is enabling organizations to operate more efficiently, flexibly, and cost-effectively, and to unlock new opportunities for innovation and growth<sup>51</sup>.

As cloud computing services is a form of outsourced services handled by others whose selling point is not only their expertise in managing the data and records entrusted to them. The reliability of cloud services lies in the assurance that they can better secure the data than the owners themselves. In line with this, the attention of cloud services consumers is often focused on the organization offering the cloud services in order to evaluate the antecedents of such organizations. In the current environment, the foremost Cloud Service Providers (CSPs) include Google, Microsoft, and Amazon. These are service providers who give to their clients the capabilities of cloud computing resources and services that are dynamically employed based on customer's demand according to a certain business model. Data and software programs are hosted on cloud servers in data centers, and users can access these services online via a web browser for fields as varied as business, education, and governance<sup>52</sup>. The IT industry has however made great strides

thanks to cloud computing that there are other, smaller technology firms offering bespoke cloud computing services to various categories of user.

There are many different companies that offer cloud computing services. Some examples of cloud service providers include Amazon Web Services (AWS) which is one of the largest and most well-known cloud service providers. It offers a range of services, including storage, computing, networking, and databases, as well as specialized services for machine learning, analytics, and the internet of things. There is also Microsoft Azure which is a cloud computing platform offered by Microsoft. It offers a range of services, including storage, computing, networking, and databases, as well as specialized services for analytics, artificial intelligence, and the internet of things.

Another is Google Cloud Platform, a cloud computing platform offered by Google. It offers a range of services, including storage, computing, networking, and databases, as well as specialized services for machine learning, analytics, and the internet of things. In addition, there is IBM Cloud, a cloud computing platform offered by IBM. It offers a range of services, including storage, computing, networking, and databases, as well as specialized services for artificial intelligence, analytics, and the internet of things. Lastly, there is Oracle Cloud which is a cloud computing platform offered by Oracle. It offers a range of services, including storage, computing, networking, and databases, as well as specialized services for analytics, artificial intelligence, and the internet of things<sup>71</sup>.

Cloud computing involves the delivery of a wide range of services over the internet. Some common types of cloud services include Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Function as a Service (FaaS), and Data as a Service (DaaS). Each of these services meet a particular need of businesses and organizations. The adoption of

cloud computing in the form IaaS provides access to computing infrastructure, such as servers, storage, and networking, on a pay-per-use basis. This allows users to access and use the resources they need without having to invest in their own hardware and infrastructure.

In the context of academic libraries, infrastructure as a service can be used to store bibliographic information resources on cloud storage instead of on computer servers in their premises. This ensures that the information is safe. Infrastructure as a service also includes the subscription to the internet in which the internet service provider (ISP) provides infrastructures such as the servers, routers, and other hardware needed to set up the internet. Academic libraries can use IaaS to access and use computing infrastructure, such as servers, storage, and networking, on a pay-per-use basis. This can help them to reduce capital expenditures and save money, while still providing the resources their users need. The implication is that the library would pay for this hardware only when they are needed. It saves cost and it also comes with expert services that ensure that the services continue to run smoothly. Libraries can also adopt cloud computing in the form of platform as a service

Platform as a Service (PaaS provides access to a platform for developing, deploying, and managing applications, without the need to manage the underlying infrastructure. PaaS enables the writing of computer systems software that is needed. This cloud-based solution allows companies to build software to integrate current apps. The surroundings of PaaS include .NET, Python, Rails, Ruby, and Java. This can include services such as databases, middleware, and other tools and technologies. Academic libraries can use PaaS to develop, deploy, and manage applications, such as library catalogs and digital

collections, without having to manage the underlying infrastructure. This can save time and effort, and allow libraries to focus on providing services to their users.

Another example is scholarly databases subscription. The library only gain access to the platform and use it to provide services to its patrons. Some of the platforms as a service that are already in used in Nigerian libraries and others across the world include, Open skies, Serial Solution (ProQuest), Future of Library is Open (FOLIO), Alma/Ex Libris, Online Computer Library Centre (OCLC), Polaris integrated library system and others<sup>53</sup>.

Libraries can also make use of cloud computing in the form of software as a service.

Software as a Service (SaaS) provides access to software applications over the internet, on a pay-per-use basis. This allows users to access and use the applications they need without having to install and maintain them on their own computers. Software as a Service (SaaS) is a novel approach to delivering applications to users over the internet, rather than downloading and installing software on individual machines. The best software for the SaaS delivery model is built with multiple users in mind. This quality refers to the software's capacity to be used by multiple entities or users at once from the same installation.

Academic libraries can use SaaS to access and use software applications, such as citation management tools and research databases, over the internet. This can provide access to advanced tools and capabilities without the need to install and maintain software on local computers. Users can access applications that are hosted on remote servers by typing in their URLs into a web browser. This decreases the initial investment needed to set up the necessary hardware, software, storage, networking, etc.

SaaS pricing is based on a monthly or annual subscription rather than the upfront cost of traditional software licenses, which typically includes the cost of upgrades and updates. With SaaS, offering services such as installation, deployment, support, maintenance, upkeep, virus control, regular backup and security, etc., is simplified. All of these services add up, even though they are invisible to the naked eye, and account for a sizeable portion of the operational expenditures of organizations such as libraries. Because the user's computer never has to store the software or data, a lot of space is not needed. SaaS offers continuous availability. If the user has access to the internet, the app is available at any time and from any location. SaaS has introduced a new revolution in the IT sector for the usage of Software, and major corporations all over the world are making the transition from the older, more conventional model to SaaS<sup>54</sup>.

Function as a Service (FaaS) provides access to small, independent units of code, known as functions that can be executed on demand. This allows users to run code in response to events or triggers, without the need to manage the underlying infrastructure. FaaS, which stands for "Function as a Service," is a type of cloud computing service that enables programmers to create, compute, operate, and manage application packages as functions without worrying about their own infrastructure.

Functions in a FaaS system are executed according to an event-driven model in stateless containers and handle logic and state on the server side by leveraging the services provided by the FaaS vendor. FaaS solutions are widely accessible on the most popular public clouds and can be supplied locally, giving enterprises a wealth of new options for app development thanks to the Internet of Things (IoT). To be ready for a serverless approach with FaaS, you need get the cloud-native strategy guide. Examples of widely

used FaaS include IBM Cloud Functions, AWS Lambda, Google Cloud Functions, and Microsoft Azure Functions (open source).

Another important type of cloud service is Data as a Service (DaaS). It is no longer feasible for organizations such as libraries to keep data locked in silos of applications or to treat it as a second-class object when designing their IT infrastructure, given the need to consume data from heterogeneous sources, both internal and external to the library, hosted either on premises or in the cloud. In order to maximize the Return on Investment (RoI) on the data available to the library as a whole, it is necessary to decouple data from applications so that the data generated by one application can be used effectively by a completely different set of applications, and so that the insights generated by analyzing the data within one section of the library can be shared and used by other sections.

This has been done by other organization in developed countries where synergy between the loyalty program and the sales team allowed for more precise product targeting and, ultimately, higher revenue<sup>55</sup>. Academic libraries can use DaaS to access and use data and data services, such as bibliographic data and metadata standards, over the internet. This can help them to manage and share their collections more effectively, and enable new forms of research and discovery<sup>56</sup>.

There is a lot of interest in cloud computing because of the potential it has to impact library personnels' ability to meet their patrons' evolving information and technology requirements. Recent studies predict that by 2027, there will be over 1.3 billion people using cloud storage. Libraries' traditional patterns of service are being disrupted by cloud computing, which also has implications for their infrastructure and upkeep. With Cloud Computing, there is no longer any requirement to acquire, setup, install, and manage

physical servers unless there is a genuine need or data security is a major concern. Instead of worrying about how to best serve your clients, Cloud Computing allows you to concentrate on developing and researching cutting-edge services. One must have a firm grasp on their financial situation before diving headfirst into Cloud storage and services. There are now a number of industry-standard storage (price).

Since moving to the cloud, library software has received a lot of attention. All library materials, infrastructure, and services will be hosted in the cloud over the next five years. New services, or those that aid academic ones, may be developed or built by us. The primary advantage of cloud computing for libraries is the relief it provides from dealing with IT issues that are peripheral to their core activities. Users are encouraged to explore and implement the cloud-based apps as they see fit. We have selected a few cloud-based programs and services that the library's user base agrees will enhance the library's collection and services<sup>57</sup>.

Overall, cloud services can provide a range of benefits to academic libraries, including cost savings, flexibility, and access to advanced capabilities. By leveraging the power of the cloud, academic libraries can improve their services and support the education and research missions of their institutions. In addition, cloud computing can be deployed in academic libraries using any of four different approaches. Private deployment, community deployment, public deployment, and hybrid deployment are the four deployment options for cloud computing. Cloud computing is a pervasive technology, point out, with examples including the widespread use of services like Microsoft Office 365, Google Apps, Dropbox, and others. The benefits of cloud computing, such as its

round-the-clock availability, rapid global expansion, and lower upfront costs for necessary infrastructure have also been credited for its widespread adoption.

Cloud computing has been increasingly adopted by academic libraries in recent years. This adoption is driven by a range of factors, including the cost savings, flexibility, and access to advanced capabilities that cloud computing offers. One of the key benefits of cloud computing for academic libraries is the ability to reduce capital expenditures. By using cloud services, academic libraries can access and use computing infrastructure, such as servers and storage, on a pay-per-use basis, without having to invest in their own hardware and infrastructure. This can save money and reduce the need for specialized IT staff to manage and maintain the infrastructure.

Another benefit of cloud computing for academic libraries is the ability to quickly and easily scale up or down as their needs change. With cloud services, academic libraries can access and use additional computing resources on demand, without having to invest in additional hardware or infrastructure. This allows them to respond to changing demands and opportunities, and to support the education and research missions of their institutions.

Cloud computing also enables academic libraries to access and use advanced technology and capabilities without having to develop and maintain them in-house. This can include access to machine learning algorithms, artificial intelligence, and other technologies that can drive innovation and unlock new opportunities for research and discovery.

Overall, the adoption of cloud computing by academic libraries is driven by the cost savings, flexibility, and access to advanced capabilities that it offers. By leveraging the power of the cloud, academic libraries can improve their services and support the

education and research missions of their institutions. However, the discussion of cloud computing in the context of academic libraries can be viewed from two different dimensions. One is the use of cloud services by librarians themselves to boost their productivity and achieve other purposes which can eventually have some sort of impact on library services. In this context of using cloud computing, the aim is to use cloud computing tools to boost productivity and personal efficiency. The use of cloud computing by academic library personnel in this regard can be for the purpose of self-development, continuing education, research, collaboration and other purposes for which the academic library and library patrons are the secondary beneficiary.

One of the tools used by library personnel included google suite. As a robust cloud service provider, Google today rivals Amazon and Microsoft in terms of cloud computing and tools that academic librarians may use for various purposes as outlined in the previous paragraph. For instance, Google provided Google which can be used to create functional websites. This is useful for personal and as well as institutional websites. Library personnel can use these sites to host their research outputs, conduct information and digital literacy trainings and general advocacy for librarianship and library users. Libraries can also create websites through the service. A rare collection can be scanned into searchable papers and made available to researchers. Any news item or institutional document can be scanned and uploaded to Google Sites for free.

Another wonder tool for library personnel is Google Calendar. This cloud tools enable people to create a sort of reminder for key dates in the year so as to plan for each date. Google calendar can be used to store special dates such as international day of the book, women's day, mental health day, literacy or reading day etc. The context of this is that

there are several days in a year set aside by organizations such as the United Nation. There are also national day celebrated in Nigeria such as Independence Day, democracy day and so on. The tool can be used to select those date relevant to the library and the library personnel. Using a cloud calendar ensure that no date is missed and reminders are sent regularly so that proper plans can be made.

Another cloud computing tool that can enhance productivity of academic library personnel is Google Form. This is used to organize events, develop student's quizzes, or gather data for various purposes particularly research. Google forms collects and store this data in the cloud. Targeted respondents can fill the forms anywhere they are and the researcher can access the data on any system anywhere provided there is internet connection. With google forms, the researcher is spared the responsibility of storing the data on a system as it is already stored on the cloud. Google Forms is also connected to google document (Google Doc) which include applications such as spreadsheet, word processors and other related applications. The responses from the Google form can be immediately transferred to a spreadsheet for further analysis. This application ensures the integrity of data, facilitate collaboration and makes it easy to work seamlessly<sup>58</sup>.

One of the most important application in the Google Doc suite of application is the word processing applications. It is very useful for preserving documents as the document is being saved online real time thereby eliminating the risk of data loss due to system crash, forgetting to save or when librarians need to work on a journey. One can easily log in and continue where he/she stopped. The application is also useful for collaboration as it eliminates the need to be sending documents back and forth from research partners. Apart

from services provided by Google, there are other cloud services that library personnel do use in research to enhance effectiveness. One of such are citation management systems<sup>65</sup>.

While keeping track of and making use of bibliographic citations is one of the most important parts of research. It is also one of the most tedious and time-consuming. Nonetheless, this is an ongoing process in the life of a researcher. Researchers must first conduct a literature search before embarking on any investigation. Depending on the type of document, the majority of them were made available either in a digital folder or a printed folder with subject tags. By using a paper filing system, the whole text of some documents is constantly at risk of being misplaced. That is why there's a plethora of research tools like citation managers. Academic library personnel can choose from various Reference management software. Cloud based reference management systems include Medley, Endnote, zotero, Bibtex, paper, Citavi, Refworks, EndNote Online, Bib Desk, Qiqqa, Cit U Like, JobRef, and Book Ends<sup>59</sup>. Another cloud services that are often used by individual professionals such as librarians is Dropbox.

Dropbox has the same function with others such as Google Drive. They allow users to back up media files such as photos and videos as well as documents and access them from any device. Dropbox enables users to store, synchronize, and retrieve files in the cloud using customer apps. To ensure consistency, Dropbox enables employers to run on each computer a specific folder that Dropbox then syncs, making it seem to be the same folder, regardless of which devices it is used to run. Public folders make it simple to share data files with the other groups with which library personnel work. In their professional capacity, experts have also recommended that library personnel can make use of Dropbox to synchronize digital collections across numerous reading devices. It is

possible to connect various devices to a Dropbox account stocked with e-books and other digital information resources. Syncing these reading materials across all of the devices and controlling it from a central location will save a lot of time needed to get information resources to library users<sup>60</sup>.

Another useful cloud tool is YouTube. This platform has become the most popular site for online, mobile, and sharing of videos. It allows users to produce and distribute various types of videos efficiently. Using the YouTube API, users may also use YouTube video content on your website, application or device. YouTube is used for most NPTEL videos. YouTube is categorized as a social media, a category which also include facebook, whatsapp, and twitter among numerous others.

With the use of these media, Users are able to keep in touch with loved ones, coworkers, and business associates by creating profiles, uploading photos, and composing and sending messages. The website's public features are available in 37 different languages. Creating and selling your own page is also an option. The library might use the Facebook application to announce upcoming programs and share other information. It's possible that a library may offer a live Facebook chat service to its patrons.

There are several service providers who exist solely to serve as cloud computing vendors for library software, search engines, digital libraries, and so on. These service providers create innovative services that can be used to boost existing library services. Some of them have been discussed in literature. These include OCLC's Webscale, OCLC's WorldShare Management Services, Ex-Libris Cloud, DuraCloud and OSS Labs among others

The OCLC's Webscale OCLC has perfected the use of cloud computing for libraries. Because they offer online cataloguing tools and permit member institutions to utilize their shared data repository, OCLC has been operating as a cloud computing vendor for years. OCLC's Worldshare Management Services are a part of the company's library management system plan (WMS). Acquiring, Analyzing, Sharing Resources, Cataloging, and Managing Licenses are just few of the many services offered by this platform. Essentially, it's a web-based software system for managing library holdings in their entirety. Libraries may easily exchange resources, data, and innovation using webscale, which is one of its primary goals. For these reasons, it incorporates a number of elements that is taken as a whole, boost the quality of library services for its patrons. Thus, libraries will save money and gain efficiency that were before unavailable to the use of separate, specialized systems<sup>61</sup>. Privacy, security, scalability, and technical support are all promised features of the service.

Ex-Libris Cloud is developed by American library automation software pioneers Ex-Libris. Using its cloud-based services, libraries can streamline their processes. Most of its products were originally designed for locally deployed solutions before being converted for use in a hosted setting<sup>62</sup>. There are already 25 libraries using Ex-Libris technology to automate their collections. It enables libraries to increase productivity, reduce operating expenses, and provide value by introducing new services. Their library-based system, Alma, has revolutionized the way that library materials are traditionally managed. By using a centralized cloud service, libraries can easily influence the collaborative efforts of the library community to deliver effective services for their users<sup>14</sup>, and they may save a lot of money in the process. It has opened data centers all over the world so it may offer

its cloud services to customers anywhere. In order to protect its clients' best interests, the company pledges to implement cloud services in accordance with data security, updates, and standards.

DuraCloud by Duraspace offers open-source repository solutions, such as DSpace and Fedora Commons implementations, as part of turnkey projects for institutions and libraries. Fedora and DSpace receive special attention and support to ensure their continued development and upkeep. When it comes to IR solutions, these open-source repositories are at the top of the list. Its newest product, DuraCloud, is a cloud-based digital preservation service that helps libraries save money and time. DuraCloud facilitates the transfer of library content to the cloud, where it can be safely stored with several providers. Online backup, preservation and archives, media access, online sharing, and a cloud broker are all part of the cloud solutions provided.

OSS labs use the Amazon Elastic Cloud Computing Platform because of its many advantages, including its high data durability, ISO standards-based robust information security, and adaptability. The OSS laboratories are supposed to be able to give reliable open-based solutions to picky clients. Koha integrated library system (ILS) and DSpace integrated repository (IR) hosting and maintenance is available from OSS Labs. The OSS Labs infrastructure is hosted on Amazon's cloud. The library's operations have become more efficient, and the staff no longer has to spend time and energy on mundane tasks like software updates and repairs<sup>63</sup>.

Cloud computing has the potential to provide significant benefits to libraries in Africa, including cost savings, flexibility, and access to advanced capabilities. However, the adoption of cloud computing by African libraries has been limited, due to a range of

challenges and obstacles. One of the main challenges to the adoption of cloud computing by African libraries is the availability and quality of internet connectivity. Many parts of Africa have limited or unreliable internet access, which can make it difficult or impossible to use cloud services effectively. In addition, the cost of internet access can be prohibitively expensive for many libraries, particularly in rural or remote areas.

Another challenge to the adoption of cloud computing by African libraries is the lack of local infrastructure and expertise. Many African libraries lack the infrastructure and technical expertise to effectively use cloud services, and may not have the resources or support to develop and maintain these capabilities. This can make it difficult for libraries to effectively use cloud services, even if they are available.

In addition, the adoption of cloud computing by African libraries is also limited by a range of cultural, legal, and regulatory challenges. These can include concerns about data privacy and security, as well as challenges related to the ownership and control of data and information. Overall, while cloud computing offers many benefits for African libraries, the adoption of these services has been limited due to a range of challenges and obstacles. In order to fully realize the potential of cloud computing in Africa, these challenges will need to be addressed and overcome.

While cloud computing offers a range of benefits for academic libraries, there are also some challenges to its adoption. Some of the key challenges of cloud computing adoption by academic libraries include security and privacy concerns. One of the main concerns around cloud computing is the security and privacy of data and information. Academic libraries handle sensitive and confidential information. Putting this data online expose them to the danger of being hacked or harvested from profit purposes. As a result, in

considering the adoption of cloud computing, libraries must ensure that this information is protected when it is stored and accessed in the cloud. On the other hand, some cloud services are so secure that the owners may not be able to access the information or transfer the data as they wish. This is as a result of vendor-lock in.

Vendor lock-in is a technique used by software providers to ensure that their clients find it difficult to switch to other providers. Using cloud services, academic libraries may become dependent on a single vendor or provider. This can create risks and challenges if the vendor goes out of business or changes its terms of service, or if the library wants to switch to a different provider. Most of the time, software developers often ensure that their system is not compatible to others. As a result, the library cannot reuse the data obtained from the business. Vendor-lock- in is often enabled by rules and regulations that clients of cloud services providers are made to sign at the beginning of the contract.

Legal and regulatory compliance issues affect the autonomy of libraries. Academic libraries must comply with a range of laws and regulations related to the handling of information and data when they are subscribing to cloud services. These rules and regulation often force libraries to operate and handle data in a manner inconsistent with their established practices. These new and complex rules and regulations can introduce new challenges and complexities in meeting the needs of the library patrons. In this case, library often have to take between effective management of data and total dominance of the data upload to the cloud and libraries must carefully evaluate and manage these risks.

Staff training and support is another challenge affecting the use of cloud computing in Nigerian academic libraries. In order to effectively use cloud services, academic library staff need to have the appropriate skills and knowledge. This may require training and

support to ensure that staff are able to use the services effectively and efficiently. Another issue that emerge out of this is the integration and interoperability. Academic libraries often have complex systems and processes, and may need to integrate cloud services with existing systems and applications. This can require significant planning and effort to ensure that the integration is successful and that the different systems and services can work together effectively. Overall, while cloud computing offers many benefits for academic libraries, there are also some challenges that must be carefully considered and managed in order to ensure a successful adoption. Various studies have examined the adoption of cloud computing as well as determinants of cloud computing adoption globally.

Cloud computing has become popular worldwide as a solution to various challenges faced by organizations in using technology for their operations. The adoption of this technology has therefore been explored in various studies<sup>68, 88</sup>. In the context of the African continent, the adoption of cloud computing is not on the same level with, developed countries in Europe and north America, but progress is being made. A study on the adoption of cloud computing shows that South Africa, Kenya, and Nigeria are the top three nations in Sub-Saharan Africa when it comes to cloud computing adoption<sup>64</sup>. A survey also indicated that 50% of large and medium-sized enterprises in South Africa were adopting cloud services, compared to 48% in Kenya and 36% in Nigeria<sup>65</sup>. Theorist on the adoption of technology have suggested that the adoption of cloud computing can be measured with system characteristic such as relative advantage, compatibility, and complexity.

The concept of relative advantage is important for innovators, entrepreneurs, and policymakers, as it helps to explain why some innovations succeed while others fail. Innovators must carefully consider the relative advantages of their innovations and communicate these benefits effectively to potential adopters. Policymakers can use the concept of relative advantage to promote the adoption of new technologies and practices that offer significant benefits to society. Relative advantage is a key concept in the study of innovation, and it refers to the degree to which a new innovation or technology is perceived to be better than the previous one it replaces. Relative advantage is often used to explain why some innovations are adopted more quickly than others. Innovations that offer a higher relative advantage are more likely to be adopted quickly, while those with a lower relative advantage may take longer to be accepted. Relative advantage can be measured in various ways, such as cost savings, improved performance, increased efficiency, enhanced user experience, or greater convenience. The perceived relative advantage of an innovation is influenced by a variety of factors, including the characteristics of the innovation itself, the existing technology or practice it is replacing, the individual or organizational adopting the innovation, and the broader social, cultural, and economic context<sup>66</sup>.

The introduction of cloud computing offers a relative advantage over traditional on-premises computing in terms of scalability, cost savings, flexibility, and innovation. In terms of scalability, cloud computing allows organizations such as academic libraries to quickly and easily scale up or down their computing resources based on demand. This means that academic libraries can easily handle sudden changes in traffic without having to invest in additional hardware and infrastructure. Cloud computing can also offer

significant cost savings over traditional on-premises computing. With cloud computing, academic libraries do not need to invest in expensive hardware and infrastructure, as they can use the cloud provider's resources instead. This can also help reduce maintenance and operational costs. Most important, cloud computing facilitate a more flexible use of technology. Cloud computing allows organizations to quickly and easily access computing resources from anywhere in the world. This makes it easier to work remotely, collaborate with others, and access applications and data from any device<sup>67</sup>.

Another relative advantage of cloud computing over the on-site system currently being used in many academic libraries is reliability. Cloud providers offer high levels of reliability and uptime, as they have redundant systems and backup processes in place. This means that academic libraries can avoid downtime and ensure that their applications and data are always available. While reliability guarantees that the system will work as advertised and any issue will be resolved by expert, security ensure that no data or information is lost. Cloud providers have robust security measures in place to protect their customers' data. This includes physical security, network security, and data encryption. Cloud providers also offer compliance certifications, making it easier for organizations to comply with regulatory requirements<sup>88</sup>. In addition, Cloud services providers are always investing in new technologies and services, which can provide academic libraries with access to new and innovative tools and capabilities that would be difficult to achieve with on-premises computing.

Studies conducted in libraries across Africa has shown that cloud computing has been found to be a cost-effective solution because of its lack of need for dedicated personnel, local knowledge and resources (such as servers), and electricity, bandwidth, operations,

and hardware. Cost savings, freedom from managing complicated IT infrastructure, adaptability, and scalability are just few of the benefits of moving to the cloud<sup>75</sup>. Cost savings on IT infrastructure and maintenance, enhanced communication, scalability, and business continuity were identified as the primary motivations of cloud adoption in a study conducted by Ghanaian researchers<sup>68</sup>. In addition to relative advantage, library personnel also adopt cloud computing based on perceived compatibility.

Compatibility is a concept in the study of innovation that refers to the degree to which a new technology or innovation is perceived to be compatible with existing technologies, practices, values, and needs of potential adopters. It is often used to explain why some innovations are adopted more quickly than others. This supports the assumption that when librarians view cloud computing as compatible to their operations and existing processes, they are more likely to make use of cloud computing. Perceived compatibility can be measured in various ways, such as the degree to which the innovation fits with existing workflows, systems, and processes; the degree to which it aligns with existing values, beliefs, and norms; and the degree to which it addresses existing needs and problems.

The introduction of new software may be perceived as less compatible with existing systems and workflows due to differences in user interface, data formats, and other factors.

The perceived compatibility of an innovation can influence its adoption rate, as innovations that are perceived as highly compatible are more likely to be adopted quickly. Available studies suggest that cloud computing is compatible with modern library services as it has been revealed that the integration of cloud computing have transformed

provision of services in academic libraries and led to the introduction of new services. Cloud computing in libraries is thus seen as having enormous benefits for library patrons because it allows access to services regardless of location<sup>69</sup>. However, while the compatibility of cloud computing has been widely acknowledged, the issue of complexity has not been clearly resolved.

Complexity of innovation refers to the degree of difficulty involved in understanding, learning, and using a new technology or innovation. It is one of the factors that can influence the rate of adoption of an innovation. Complexity can be measured in various ways, such as the level of technical knowledge and skills required to use the innovation, the degree of change required to existing workflows and practices, the level of uncertainty or risk associated with the innovation, and the ease of learning and training required. For example, the introduction of a new software system that requires significant technical expertise and training may be perceived as more complex than a system that is easy to use and requires minimal training. Similarly, the introduction of a new medical treatment that involves significant risks and uncertainties may be perceived as more complex than a treatment that is well established and has a proven track record.

The complexity of an innovation can determine its rate of adoption, as innovations that are perceived as highly complex are more likely to be adopted more slowly. However, it is important to note that complexity is not the only factor that influences adoption, and other factors such as relative advantage, perceived compatibility, observability, and trialability can also play a role. The concept of complexity of innovation is important for innovators and entrepreneurs, as it highlights the need to design innovations that are easy to use and understand, and that require minimal changes to existing practices and

workflows. It is also important for policymakers, as they can use the concept of complexity to identify barriers to adoption and develop policies that promote the adoption of new technologies and practices.

Complexity is an important factor to consider when deciding to use cloud computing. The cloud can offer a variety of benefits, such as scalability, cost savings, and flexibility. However, the complexity of the applications and services being migrated to the cloud can impact the ease and cost of migration, as well as the ongoing management and optimization of the cloud environment. Experts have identified various complexity issues that might affect the adoption of cloud computing. These include migration, system management, system performance and data security. Complex applications can be difficult and time-consuming to migrate to the cloud. This can lead to increased costs and delays in realizing the benefits of cloud computing. Applications with interdependencies, legacy code, or custom configurations may require additional effort to migrate<sup>70</sup>.

In addition, the complexity of applications and services can also impact the ongoing management of cloud environments. Cloud service providers offer a variety of tools and services to manage cloud environments, but these can be challenging to use and require specialized skills which many librarians may not possess. Complex applications may require more advanced management and monitoring tools, which can add to the overall cost of cloud computing. Added to this is the issue of performance. Complex applications may require more compute resources or specialized hardware to perform optimally in the cloud. This can increase the cost of cloud computing and make it more challenging to optimize performance<sup>89</sup>. Complex cloud computing applications may have more security requirements, such as compliance regulations or data privacy concerns. Cloud providers

offer a range of security features, but it is up to the user to configure these appropriately. Failure to properly secure complex applications in the cloud can lead to data breaches or other security incidents.

In summary, while cloud computing offers many benefits, the complexity of applications and services being migrated to the cloud can impact the ease and cost of migration, ongoing management, performance, and security. It is important to carefully consider these factors before moving to the cloud and to work with experienced cloud providers and consultants to ensure a successful migration and management experience.

### **2.1.3 Digital Literacy Competency**

Digital literacy refers to the ability to use digital technologies effectively and efficiently to locate, evaluate, create, and communicate information. It involves a range of skills, including the ability to use computers, smartphones, and other digital devices; navigate the internet; find and use information from digital sources; evaluate the quality and reliability of digital information; and communicate effectively through digital media. Digital literacy is becoming increasingly important in today's society, as more and more information is being created and shared through digital channels. People who are digitally literate are better equipped to participate in the digital economy, access educational and employment opportunities, and engage with others in online communities.

Digital literacy is not only important for individuals but also for businesses and organizations such as libraries. In order to remain competitive, academic libraries need personnel who can effectively use digital technologies to collaborate, innovate, and solve problems for the modern library users. Additionally, academic libraries need to be able to

communicate with patrons through digital channels, and they need to have the skills to effectively market the library collections and services online<sup>71</sup>.

Digital literacy competency refers to an individual's ability to use digital technology effectively and efficiently in a variety of settings. This can include using computers, smartphones, tablets, and other digital devices to access and manage information, communicate with others, and complete tasks. Digital literacy competency is becoming increasingly important in today's world, as more and more aspects of our lives are being conducted online and through digital means. To be digitally competent, an individual should be able to navigate the digital landscape with ease, understand how to use a variety of digital tools, and know how to stay safe online.

Digital literacy competency, also known as digital literacy or digital skills, refers to an individual's ability to use technology effectively to access and manage information, communicate with others, and perform tasks efficiently. It involves a range of skills, including basic computer literacy, the ability to use software and applications, the ability to find and evaluate information online, and the ability to use technology to solve problems. Digital literacy competency is a complex term with a very wide scope depending on the exposure and technology awareness of the scholar. This is so because digital literacy competency is a social construct with implication for diverse stakeholders. The seeming lack of any universally agreed metrics to measure digital literacy has led to the development of various frameworks such as the DigComp.

DigComp is a framework for digital literacy competency that was developed by the European Commission in collaboration with experts from across Europe<sup>72</sup>. It provides a comprehensive set of competencies that individuals, educators, and policy makers can use

to assess and develop digital skills. The framework is organized into six broad categories: information and data literacy, communication and collaboration, digital content creation, safety and security, problem solving and decision making. Each category includes a set of specific competencies, with clear descriptions and examples of what individuals should be able to do at different levels of proficiency.

Data and information literacy are important competency within the DigComp framework. Data literacy refers to an individual's ability to understand and work with data, including the ability to find, access, and use data effectively. Information literacy, on the other hand, refers to an individual's ability to find, evaluate, and use information effectively. Both of these competencies are important for individuals to be able to navigate the digital world and make informed decisions based on the information they find. At the Independent User level, individuals are expected to have the skills necessary to find and evaluate information online, including the ability to identify credible sources, assess the relevance and reliability of information, and use technology to organize and manage information effectively.

At the Proficient User level, individuals are expected to have the skills necessary to use technology to analyze and interpret data, such as the ability to use spreadsheet software to organize and analyze data, create charts and graphs, and apply basic statistical analysis techniques. At the Expert User level, individuals are expected to have advanced skills in data and information literacy, such as the ability to use advanced data analysis tools and techniques, interpret complex data sets, and use technology to support decision making and problem solving. Another skills in the framework is digital content creation.

Digital content creation refers to the process of creating and publishing digital content, such as videos, images, audio, text, and interactive media, for distribution and consumption through digital channels, such as the internet and social media. Digital content creation involves a variety of skills and techniques, including content planning and strategy, writing and editing, graphic design, audio and video production, animation, and programming. The goal of digital content creation is to create engaging and valuable content that attracts and retains an audience, builds brand awareness, and drives conversions. With the rise of social media and other digital platforms, digital content creation has become an increasingly important part of marketing and communication strategies for academic libraries.

Some examples of digital content creation include blog posts, social media posts, podcasts, webinars, videos, animations, infographics, e-books, and white papers. The key to successful digital content creation is to understand the needs and preferences of the target audience, and to create content that is relevant, informative, and entertaining. At the Proficient User level, individuals are expected to have the skills necessary to create and edit digital content, such as the ability to use word processing and presentation software, create and edit audio and video content, and use technology to support collaborative work<sup>73</sup>.

At the Expert User level, individuals are also expected to have advanced skills in digital content creation, such as the ability to use technology to create and design digital media, develop new applications and technologies, and contribute to the digital economy. At the Digital Creator level, individuals are expected to have the skills necessary to create and design digital content, develop new applications and technologies, and contribute to the

digital economy. This may include skills such as web design, app development, and the ability to create and manage digital content and projects<sup>94</sup>.

Communication and collaboration are two important aspects of any successful team or organization. Communication refers to the exchange of information, ideas, and thoughts between individuals, while collaboration involves working together to achieve a common goal. Effective communication and collaboration require clear and consistent messaging, as well as an understanding of each individual's role and responsibilities. Digital communication and collaboration skills are essential skills for library personnel in the digital age. Library personnel use digital technologies to communicate and collaborate with colleagues and patrons in various ways

One of such is the use of emails. Email is a basic digital communication tool that allows library personnel to send and receive messages quickly and efficiently. It is important for library personnel to be able to write clear and concise emails, and to use proper etiquette when communicating with colleagues and patrons. As emails are becoming less used, library personnel are also moving to instant messaging applications. Instant messaging application such as WhatsApp, telegram, skype, google meet among others, can be used to communicate with colleagues and library patrons in real-time. This can be especially useful for quick questions or discussions that do not require a full meeting.

The use of instant messaging conference application became more rampant during the COVID-19 pandemic and those who lacked the required skills found it difficult. Video conferencing tools like Zoom or Google Meet were constantly being used for virtual meetings with colleagues or patrons. This is especially useful for remote work or for patrons who were unable to visit the library in person. Library personnel can use social

media platforms like Twitter or Instagram to connect with patrons and promote library services and programs. Collaboration tools like Google Docs or Microsoft OneDrive were also been used to collaborate on documents and projects with colleagues. This allows multiple people to work on the same document simultaneously, making it easier to track changes and collaborate effectively. By using digital communication and collaboration tools effectively, library personnel can improve communication with colleagues and patrons, streamline workflows, and deliver more effective services and programs. When library personnel acquire the necessary skills to communicate and collaborate, they must also learn how to keep themselves, the digital devices they use, and their patrons safe on the cyberspace.

Online safety is an important aspect of digital literacy competency. This can refer to a variety of different things, including the safe and responsible use of technology, protecting personal and sensitive information online, and being aware of potential risks and threats. Safety practice that must be learnt include password management. Using strong passwords for all digital devices, applications, and online accounts and avoid using common words, phrases, or personal information that can be easily guessed are the basic aspect of safety. Library personnel must learn this and also teach their patrons and the general public. The idea of safety as digital literacy competency also include netiquette.

Netiquette refers to one's ability to follow all the usual social courtesies usually observed in the physical environment in the digital space. It means ensuring that one or those one interact with online do not jeopardize the physical and mental health of others. Library personnel must learn to maintain impeccable online personality and educate others to do so too.

Safety also means the protection of physical infrastructure that constitute the cyberspace. While library personnel are not responsible for the whole cyberspace, it is important that they ensure the safety and the security of the hardware they use in joining the cyberspace. It is important to be aware of and follow safety measures such as the need to keep software up to date, install antivirus software on all digital devices and keep it up to date. Skilled library personnel can also use encryption to protect sensitive data such as passwords, financial information, and personal data. Encryption scrambles data so that it can only be read by authorized individuals. Another safety practice is the use of two-factor authentication. Enabling two-factor authentication on all online accounts for an extra layer of security added more security to the use of digital devices<sup>74</sup>.

Problem solving is an important part of digital literacy competency. This involves using technology and digital tools to identify, analyze, and solve problems. This can include using search engines and online resources to research and gather information, using spreadsheet and data analysis software to organize and analyze data, and using programming and coding languages to develop solutions to complex problems. Developing strong problem-solving skills can help individuals to be more effective and efficient in their use of technology, and can enable them to take advantage of the many opportunities that the digital world has to offer<sup>75</sup>.

Academic library personnel need a range of digital literacy competency in order to effectively support the education and research missions of their institutions. Some examples of digital literacy competency for academic library personnel include information literacy, digital content management, technology skills, data literacy, and user experience design among others. Academic library personnel need to be able to help

users find, evaluate, and use information and sources effectively and responsibly. This includes skills such as database searching, citation management, and critical thinking. All of these skills are essential in the modern digital rich information environment in which the modern academic library operate<sup>95</sup>.

The proliferation of digital resources has also led to the need for digital content management skills among library personnel. Academic library personnel need to be able to manage and curate digital collections, including the creation and maintenance of metadata and other technical standards. Academic library personnel also need to be able to use a range of technology tools and platforms, including library management systems, digital repositories, and social media. Academic library personnel need to be able to design and improve user experiences with library services and resources, including online and in-person interactions. This includes skills such as usability testing, user research, and user-centered design. In addition, with the attention shifting to data management, academic library personnel need to be able to understand and use data to support decision-making, evaluation, and research. This includes skills such as data visualization, statistics, and data management<sup>96</sup>.

The digital literacy competency of library personnel can vary depending on many factors, such as their training, experience, and the resources available to them. In general, library personnel are expected to have a high level of digital literacy competency, as they often need to use technology and digital tools to access, manage, and share information. This can include using cataloguing and database software to manage collections, using online resources to research and provide information to patrons, and using social media and other digital platforms to promote library services and resources. To ensure that library

personnel have the necessary skills and knowledge, many libraries provide training and support for them. In order to effectively support the education and research missions of their institutions, library personnel in Africa need a range of digital literacy competency. These competencies enable library personnel to provide high-quality services and support that meet the evolving needs of their users<sup>76</sup>.

One of the key digital literacy competencies for library personnel in Africa is information literacy. This involves the ability to help users find, evaluate, and use information and sources effectively and responsibly. This includes skills such as database searching, citation management, and critical thinking. In the African context, information literacy also involves the ability to navigate the challenges and opportunities of the digital landscape, including issues related to access, affordability, and digital divide.

Another important digital literacy competency for library personnel in Africa is digital content management. This involves the ability to manage and curate digital collections, including the creation and maintenance of metadata and other technical standards. In the African context, this can also include the ability to preserve and promote local and indigenous knowledge, and to support the development and sharing of digital collections that reflect the diversity and richness of African culture and heritage. In addition, library personnel in Africa also need technology skills in order to use a range of technology tools and platforms, including library management systems, digital repositories, and social media. This can enable library personnel to provide high-quality services and support that are accessible and relevant to their users.

Furthermore, library personnel in Africa also need data literacy in order to understand and use data to support decision-making, evaluation, and research. This includes skills

such as data visualization, statistics, and data management. In the African context, data literacy can also involve the ability to use data to understand and address social and economic issues, and to support the development and implementation of policies and programs that can improve their staff to develop and maintain their digital literacy competency. The Digcomp framework is intended to be flexible and adaptable, so that it can be used in a variety of different contexts and for different purposes. Basically, the frame recognize that an individual should develop six basic competencies. However, the level of the skill acquired should be a function of the task or responsibilities that will be expected of such individual<sup>77</sup>.

The import of this is that library personnel should have a higher level of digital literacy competency compared to the library patrons. The level of skills in the framework are basic users, independent users, proficient users, expert user, digital creator, and digital leader. Basic users are those with basic computer skills. These categories of people have the ability to use a keyboard and mouse, navigate the internet, and use basic applications such as a word processor. They are however limited in what they can do. When facing complex tasks, such people would need to seek help from those who are more skilled.

Obviously, while library users can belong to this category, it is not befitting for a professional library personnel who is expected to offer help to the struggling library users facing difficulty in the use of library services and collections. Study have however shown that library personnel, especially in Nigeria, are mostly among the basic technology users<sup>78,79,80</sup>. Library personnel's digital literacy competency level should be at the minimum, independent user level.

Independent users of technology are those individuals have the skills necessary to find and evaluate information online, communicate with others using digital tools, and use software and applications more effectively. Library personnel in modern academic libraries must be independent users of technology as they rely on technology to manage and organize the vast amounts of information that they work with on a daily basis. Technology has revolutionized the way that library personnel perform their tasks, from cataloging and classifying resources to providing access to electronic databases and online resources. Library personnel also use technology to create and maintain digital archives, digitize rare materials, and manage digital collections<sup>96</sup>.

Library personnel use a variety of software and tools to perform their duties, such as library management systems, content management systems, online databases, and search engines. They also use social media platforms to connect with library users and promote library resources and services. In addition to using technology to manage and organize information, library personnel also use it to stay up-to-date with the latest trends and developments in their field. They use online resources to research new technologies, attend webinars and online training sessions, and collaborate with colleagues around the world<sup>81</sup>. There is a recognition among modern library personnel that the level of independent user may not be enough for library personnel considering the level of technology advancement and the fact that library personnel are expected to also inculcate digital literacy competency in others. To do this effectively, they must be proficient technology users.

Proficient technology users have the skills necessary to use technology to solve problems, create and edit digital content, and collaborate with others online. Library personnel

today are expected to be proficient technology users as technology plays a vital role in managing and disseminating information. With the increasing prevalence of digital resources, librarians need to be familiar with a wide range of technological tools and platform. This is not limited to library technology but other technology that may be used by library patrons. In line with this, it seems that library personnel have to attain high level of digital literacy competence.

Library personnel should do well to attain the level of expert user. This level includes competency related to advance digital skills, such as the ability to use technology to innovate and create new solutions, manage complex projects, and analyze and interpret data. In the developed world, many library personnel have become digital creator<sup>99</sup>. These are the professional with the skills necessary to create and design digital content, develop new applications and technologies, and contribute to the digital economy. In the context of Nigeria, digital literacy competency has also being found to be necessary as the promotion of inforpreneurship demands that library personnel attain the level of digital leader. This is a level where people achieve competency related to leadership and entrepreneurship in the digital world, such as the ability to inspire and motivate others, drive innovation, and manage digital projects and teams effectively<sup>101</sup>.

All of these are necessary because library personnel are now fully involved in technology orientated tasks such as digital cataloging and metadata management tools to organize digital resources effectively. They are also expected to be involved in electronic resource management systems (ERMS). These are software tools that help library personnel manage their electronic resources. The technology assist in tracking usage, managing subscriptions, and providing access to electronic content. Another emerging technology

application is open access and institutional repositories. Library personnel should be knowledgeable about open access and institutional repositories. They should be able to help patron's access open-access resources and assist in managing institutional repositories. In addition, as libraries digitize their collections, it is crucial to ensure that digital content is preserved for future generations. Library personnel should be familiar with digital preservation strategies and tools to ensure the long-term accessibility and usability of digital content<sup>101</sup>.

Furthermore, social media is an effective way for libraries to reach out to their patrons and communities. Library personnel should be proficient in using social media platforms to promote library services and engage with patrons. Library personnel should also be able to teach patrons how to use digital resources effectively. They should be able to provide instruction on database searching, evaluating information, and citation management tools. Most importantly, libraries often have complex websites that provide access to a wide range of resources. Library personnel should be able to manage and update library websites using content management systems like WordPress or Drupal. In summary, library personnel today must be proficient in a wide range of technological tools and platforms to effectively manage and provide access to digital resources. The above skills and tools are essential for library personnel to excel in their roles and provide quality services to their patrons.

There are a number of challenges that can prevent African library personnel from acquiring the digital literacy competency they need to effectively support the education and research missions of their institutions. Some of the key challenges in acquiring digital literacy competency among African library personnel include limited access to

technology and internet connectivity. Many parts of Africa have limited or unreliable internet access, which can make it difficult or impossible for library personnel to access the training and resources they need to develop their digital literacy competency. In addition, the cost of technology and internet access can be prohibitively expensive for many library personnel, particularly in rural or remote areas.

Another challenge militating against the development of digital literacy competency is lack of funding and support. Library personnel in Africa often face limited funding and support for professional development and training, which can make it difficult for them to acquire the skills and knowledge they need to use technology effectively. This can be particularly challenging in the face of rapidly evolving technology and changing user needs. In situation where the parent institution has made effort to provide some level of funding, the barrier of cultural and language barriers also affect the situation. Library personnel in Africa often face challenges related to language and cultural barriers, which can make it difficult for them to access and use training and resources that are available in other languages or that are not tailored to their local context<sup>82</sup>.

Many African libraries lack the technical expertise and infrastructure to effectively use technology and digital services, which can make it difficult for library personnel to develop their digital literacy competency. This can include challenges related to the availability and quality of technology, as well as the need for specialized staff to manage and maintain the infrastructure<sup>83</sup>. Overall, while digital literacy competency is essential for African library personnel to effectively support the education and research missions of their institutions, there are many challenges that can prevent them from acquiring these competencies. Addressing these challenges will require a range of efforts, including the

provision of technology and internet access, funding and support for professional development, and the development of local expertise and infrastructure<sup>84</sup>.

In order to develop the digital literacy competency of African library personnel, there are a number of solutions that can be implemented. Some examples of potential solutions include providing access to technology and internet connectivity. One of the key challenges to the development of digital literacy competency among African library personnel is the lack of access to technology and internet connectivity. Providing library personnel with access to these resources can help to overcome this challenge, and enable them to access the training and resources they need to develop their digital literacy competency. This can include initiatives such as internet connectivity projects, technology grants, and the establishment of technology centers and hubs.

Library personnel in Nigeria also need professional development and training. Many of the academic library personnel often face limited funding and support for professional development and training, which can make it difficult for them to acquire the digital literacy competency they need. Providing funding and support for professional development and training can help to overcome this challenge, and enable library personnel to access the training and resources they need to develop their digital literacy competency. This can include initiatives such as training programs, workshops, and conferences<sup>105</sup>.

## **2.2 Theoretical Framework**

### **2.2.1 LibQUAL+**

LibQUAL is a standardized survey tool that is used by libraries to measure the service quality they provide to patrons. The LibQUAL scale consists of 22 items that are grouped into three dimensions: Library as Place, Affect of Service and Information Control<sup>85</sup>. The Affect of Service dimension measures the emotional aspect of the library experience, such as the level of trust and confidence that patrons have in the library's staff and services. The Information Control dimension assesses the patron's ability to access and control information, such as the availability and reliability of the library's collections and resources. The Library as Place dimension evaluates the physical space of the library, including the cleanliness, comfort, and accessibility of the library's facilities. The LibQUAL scale is a widely used and reliable tool for assessing service quality in libraries.

LibQUAL™, designed by Academic and Research Libraries (ARL) in partnership with Texas A&M University Libraries, is one measurement activity that has been developed to solicit, track, understand, and act upon users' opinions of library service quality. It has emerged as both a process and a tool that enables institutions to address service quality gaps between their expectations and their perceived service delivery program<sup>86</sup>. It is an internationally recognized web-delivered survey that now includes hundreds of libraries of all sizes throughout the world and pioneering the use of large-scale, web-based survey applications in a digital library environment. It is a tool that attempts to measure library users' perceptions of service quality along three dimensions such as: library as place (LP), affect of service (AS) and information Control (IC) and identifies gaps between desired, perceived, and minimum expectations of service. The survey instrument is designed to be useful to the library administration on several levels: identifying deficits in service performance at an individual library, allowing comparisons with cohort libraries

from multiple perspectives, identifying best practices, and responding to pressures for accountability<sup>106</sup>.

LibQUAL+ is a well-known tool for libraries to “identify best practices, analyze deficits, and effectively allocate resources”<sup>87</sup>. It was developed to capture a multi-dimensional service model and the corresponding user satisfaction. The LibQUAL+ instrument has been available to libraries for implementation since 2004. This evaluation package comprises of three dimensions, Library as Place(LP), Affect of Service (AS), Information Control(IC), broadly evaluating the information and advice provided by library personnel, content/ collection quality and accessibility, and space quality and availability. The LibQual+ instrument is a universally accepted tool for evaluating the quality of all types of libraries. To date, there have been 3,987 institutional surveys, which have been implemented across 3,213 institutions in over 32 countries, 21 language translations, and over 3.5 million respondents<sup>88</sup>.

The validity and reliability of the LibQUAL+ instrument has been repeatedly ascertained<sup>89</sup>. It is currently adopted by more than three thousand institutions globally to identify best practices, analyze deficits, and effectively allocate library resources<sup>9</sup>. With a gap analysis based on survey data for each of the three service dimensions and their components, libraries can invest resources to reduce any service adequacy gap (difference between perceived service level and the minimum acceptance level) or extend service superiority (difference between perceived and desired service levels) pin pointedly.

While LibQUAL+ provides rich and differentiated data on a range of variables, it appears to leave two major questions unanswered. First, research on LibQUAL+ has not provided empirical evidence that user satisfaction is related to academic performance (Perceived

Academic Success) or behavior (Intention to Use Library More in future). Both of these success measures are becoming increasingly important as libraries need to justify their resource commitments in tangible terms<sup>90</sup>. Second, LibQUAL+ does not reveal the relative importance of different service dimensions of user satisfaction. In other words, it does not tell library personnel whether a unit of improvement in Information Control is more important for user satisfaction than a unit of improvement in Library as Place. Only with this information being known, library personnel can make the best resource allocations.



**Fig 2.1: LibQual Model 106**

### **2.2.2 The Digital Literacy Competency Framework for Citizens (DIGCOMP 2.0)**

The Digital Literacy Competency Framework (Digcomp 2.0) was developed by the European Commission (DigComp 2.0)<sup>91</sup>. The Digcomp identified the constructs of digital literacy competency needed by anyone to function in the modern society to

include information and data literacy, communication and collaboration, online safety, and problem solving. Because the DigComp was developed for European countries with advanced technology and better opportunities for citizens compared to the rest of the world. However, it has inspired other similar frameworks aimed at catering for developing countries.

One of such frameworks is the Digital Literacy Global Framework (DLGF) which was developed by the United Nation's Education, Scientific and Cultural Organization (UNESCO) in 2018 as a tool to measure digital literacy worldwide retained all of the constructs of the DigComp but in a simplified manner. However, since library personnel are expected to operate in a globalized environment, the DigComp 2.0 is considered relevant for this study as it holds library personnel to the highest standard of digital literacy competencies. The competencies are "Devices and software operations" which basically focuses on basic ICT skills and "Career-related competency. Therefore, the constructs of digital literacy according to the DigComp 2.0 are; information and data literacy, communication and collaboration, online safety, and problem solving, and career related competencies. All of these are meant to be exhaustive and open to adaptation as required by specific situations <sup>107</sup>.

For the current study, the focus will be on information and data literacy, Communication and Collaboration, digital content creation, online safety and problem Solving. All of these are directly related to the subject of the study which is the use of online information resources. As pointed out by a scholar, legal professionals do not have to become tech experts in order to use online information resources. Having the basic and functional skills that helps them to identify, retrieve and use the needed resources enough<sup>92</sup>.

Information and data literacy covers the ability to clearly communicate information requirements and be able to identify and retrieve digital data, information, and content. It also encompasses the ability to assess the relevance and content of information sources and information resources. Information and data literacy also extend to the storage, managing, and organizing digital data, information, and material that have been identified and retrieved for use.

Communication and collaboration are essential skills in today's digital world, where people often work remotely and across different time zones and cultures. This competency focuses on understanding different communication channels such as email, instant messaging, video conferencing, and social media have different strengths and weaknesses. It guides on how to choose the most appropriate channel for the task and the audience. It also focuses on the awareness and use of collaborative tools such as shared documents, project management software, and online whiteboards that can help teams work together more effectively<sup>113</sup>.

The third construct is digital content creation. This involves the ability to develop and refine computer-based media. It also includes proper grasp of copyright and other relevant laws guiding the use of digital information and the ability to create, synthesize and integrating information and content into an existing body of knowledge. This also applies to academic library personnel. It means their ability to create legal document from online information resources and save them in the appropriate format. Academic library personnel are expected to be able to bring information together from diverse online information resources and create a coherent, meaningful and useful resources to expand the frontier of knowledge<sup>112</sup>.

Online safety is another element of digital literacy competency. It is the ability to protect oneself and others from digital threats and risks. It is an important aspect of digital literacy competency and refers to the measures and precautions taken to ensure the security of digital devices, networks, and data from various threats and risks such as cyber-attacks, malware, hacking, cyberbullying, cyberstalking, and cybercrime. This skill is useful for academic library personnel engaged in the teaching of information and digital literacy. However, before library personnel can teach this skill, they too must acquire it. This is important because library personnel are now being expected to play the role of problem solvers in the digital environment.

Problem solving is an important aspect of digital literacy competency and refers to the ability to solve problems and make decisions using digital tools and technologies. Skilled technology users who wish to engage in digital problem solving must learn the skills and steps which include defining the problem, gathering information, analyzing the available information, evaluate possible solutions, implement the solution. After all these, the expert must reflect and learn from the whole process. Academic library personnel have to play the role of problem solvers because majority of their clients are new to technology especially as it applies to scholarly research. In addition, many librarians are now providing digital library services, which means that students often come to the library either to use the library systems or their own digital devices. The students expect academic library personnel to be able to help whenever they encounter any challenge in the course of using the systems<sup>112</sup>.



**Figure 2.1: DigComp 2<sup>112</sup>.**

### **2.2.3 Innovation Diffusion Theory (IDT)**

The Innovation Diffusion Theory was developed by a scholar named Everest Rogers in 1983. It is developed to explain how individuals and groups come to accept new innovations being introduced to them<sup>93</sup>. Innovation is a concept used to represent the application of new ideas to create new products and processes. Innovation is different from invention which deals with the development of a whole new product, idea or service from scratch. Innovation on the other hands deals with transforming existing resources into a totally new way of thinking, operating and a new product which is based on an existing one but with fundamental differences. One important thing to note about

innovation is that they are not time bound. A product that has been existing previously is an innovation to someone or group of people coming into contact with it for the first time. Therefore, what is regarded as an innovation is relative. In this sense, cloud computing are innovations to library personnel who are not previously familiar with them<sup>94</sup>. The Innovation diffusion theory postulates that innovations are accepted or rejected based on certain factors.

The theory categorizes innovation adoption based on how quickly (or slow) the target users eventually accept innovations. It also seeks to explain the stages an innovation has to go through before it is finally adopted by the target users. In addition, it outlines the factors or criteria adopted by potential users in evaluating information systems before they make the decision to adopt or reject a new innovation. The first focus of the theory is to identify various categories of innovation adopters. These are identified as; Innovators which describes those who seem to be open to challenges and the first to attempt new ideas.

There are also those who are categorized as early adopters which include all those who are interested in exploring new technologies and demonstrating their values in the society. The early majority are those who lead the way for the implementation of an invention throughout mainstream culture and are part of the general population. We also have the late majority and this group is a subset of the general population i.e., the set of people who follow the early majority into adopting the innovation as part of their daily life. The last group is called Laggards which include those who lag behind the overall population in embracing innovative technology and fresh ideas<sup>95</sup>.

The second stage of the theory outlines the stages of innovation adoption which are; knowledge, persuasion, decision, implementation and confirmation stages. (Figure 2.1).

The knowledge stage is where potential users become aware of the innovation's existence and gets interested in understanding its functions. In the case of cloud computing, this knowledge might come from seminars. Workshops, in-house training and personal research. Library personnel can also become aware of cloud computing through other sources such as colleagues and academic conferences. They may also come across the information while surfing the internet. The next stage after knowledge is the persuasion stage.

The persuasion stage is where the library personnel are presented with information that enable them to appraise a particular cloud computing service to determine the potential worth of embracing it. It should be noted that the persuasion is often done by software vendors who are expected to create awareness about the cloud computing and promote its usefulness to various users such as library personnel<sup>96</sup>. In this stage, it is vital that the cloud computing services are perceived as useful by the library personnel. The information provided during the persuasion stage is expected to guide the decision of the library personnel whether to adopt or reject the introduced cloud computing.

The adoption or rejection of the cloud computing is however a fluid decision, subject to change. The Diffusion Innovation Theory categorized adoption into continued adoption and discontinuance. Continued adoption is when the library personnel continued to use the cloud service after the initial use while discontinued adoption is the decision not to continue using the service. This may happen especially when there is no continued support by the library to make the use of the cloud computing easily and free of stress.

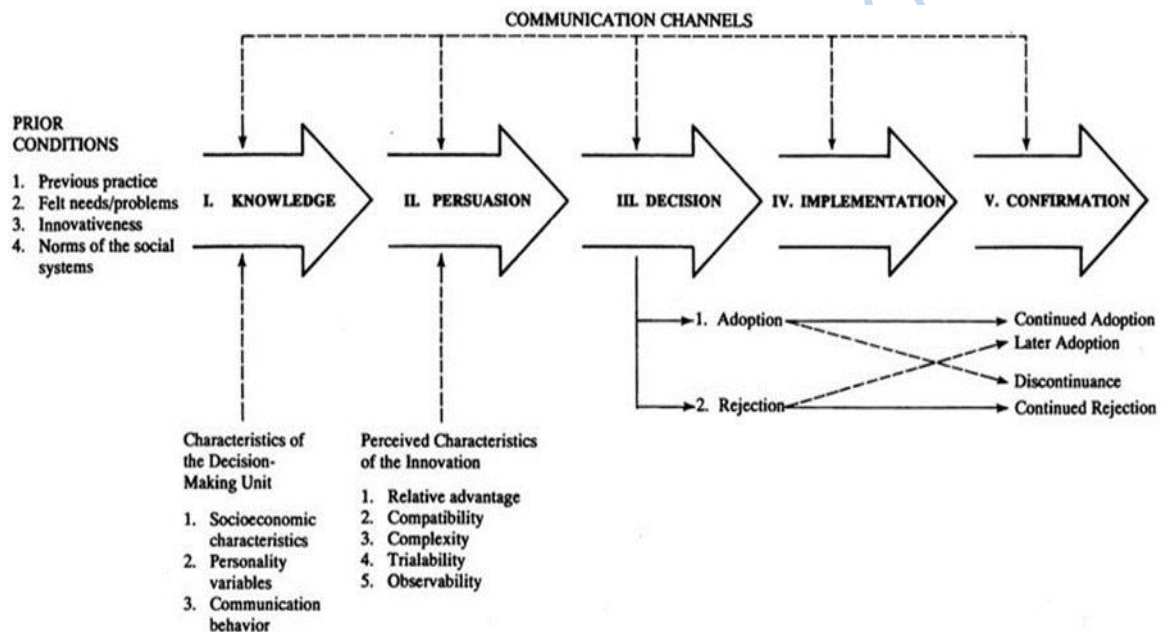
Similarly, the initial rejection of the cloud computing is not final. The user may later decide to start using the service after some period of rejection (later adoption), probably after being trained on the use of the cloud computing or after getting more information about its advantages. It is also possible that the user remained unconvinced and refrain from using the service or technology despite all efforts to the contrary (continued rejection)<sup>97</sup>.

The several phases of innovation diffusion from knowledge to persuasion, decision making, implementation and confirmation traces the communication effort to introduce the library personnel to the use of cloud computing. Theoretically, the cloud computing is an innovation to the library personnel because they are just being introduced to it. The cloud computing as something which library personnel are not used to previously often seems like an innovation which makes the innovation diffusion theory applicable in studying its use among them.

As shown in figure 2.3, when library personnel gain knowledge about the cloud computing, it seems novel to them and they become interested in it. However, because they are already used to other information sources, they can only be persuaded after they have considered various attributes of the innovation (i.e. cloud computing). Indeed, consideration of the innovation attributes is essential because, ultimately, the decision to adopt new technologies such as cloud computing is mostly based on the perceptions of the potential users, irrespective of the opinion of the innovation promoters<sup>98</sup>.

As posited in the Diffusion of Innovation theory, the persuasion stage is based on perception rather than cognition. As a result, the decision made in the persuasion stage about the innovation is based on subjective judgement rather than objective evaluation.

At this stage, the library personnel would typically seek out information about cloud computing from trustworthy friends and colleagues whose subjective impressions of the technology, instead of experts, are considered most convincing<sup>95</sup>. According to the diffusion of Innovation theory, library personnel are more likely to seek information about attributes of cloud computing such as; relative advantage, compatibility, complexity, trialability, and observability which are the third focus of the theory.



**Figure 2.1: Diffusion of Innovation Theory<sup>114</sup>.**

Relative advantage is the degree to which library personnel believe that cloud computing is an improvement over the other technology it seeks to replace or complement. According to the Diffusion of Innovation theory, cloud computing that offer a distinct and undeniable advantage over the other storage devices that have been used up until now would have an easier time being accepted and put into use by library personnel. Cloud computing is judged to have a relative advantage when they are seen to be significantly

better in terms of the cost, convenience and performance than the previous storage devices being used by library personnel. The characteristic of relative advantage indicates the requirement of information systems developers to create systems that will be superior in benefit in terms of improved value, low cost, low-risk etc.

The choice to embrace technology is impacted by two elements which are; capacity of a potential adopter to determine if the advantages of utilizing the innovation will outweigh the stress of adopting it and whether the innovation improves upon the existing technology. The greater value individuals expect from adopting the invention relative to what they already use, the more swiftly it will become widely accepted<sup>99</sup>. In addition to relative advantage, the Diffusion of Innovation theory also suggested that the innovation must be compatible to the needs of the potential adopters.

Compatibility refers to the degree to which an innovation is viewed as being compatible with personal standards, which is a determining element of intention to embrace innovation. Any new innovation should be compatible “with existing values, skills, and work practices of potential adopters<sup>95</sup>. Compatibility positively influenced user attitude, and attitude affected the desire to adopt as well as use, cloud computing<sup>96</sup>. Some research found that relative advantage and compatibility favorably increased the desire to adopt new innovations, but complexity negatively affected the intention to adopt and use cloud computing.<sup>95,96,101</sup>

Complexity is the third attribute of innovation outlined in the Diffusion of Innovation theory. It is the degree to which an invention is seen as somewhat difficult to comprehend and used. An excessive intricacy of an innovation is a key hurdle to its acceptance. The expectation of library personnel is to be able to organize, preserve, and retrieve

information with as little efforts as possible. In line with this, they often make the decision whether to accept or reject cloud computing due to their perception of complexity or simplicity. It is observed that users often believe an innovation would be complex to use until they receive information to the contrary from trusted sources<sup>100</sup>. It is the subjective perception formed from the interaction with these sources that guide the users in making decision whether to use or reject the innovation. For scholarly database, there have reports of complexity issues such as multiple login password, unfriendly users interfaces and other issues that make it difficult for library personnel and other user groups to use them<sup>101</sup>. This may contribute to low level of use for these databases. However, the perception of complexity can be mitigated through the idea of trialability.

Diffusion of Innovation theory has been used in several fields to forecast how and why an invention will thrive, including education communication, marketing, and information technology. Researchers from different backgrounds have conducted a lot of studies that have proven the effectiveness of the system perceived characteristics model<sup>102</sup>. System perceived characteristics has also been widely used in analyzing the dissemination of innovation in numerous fields, which includes crowdsourcing, and open-source software and information retrieval systems such as OPAC, institutional repositories and others. In addition, due to the suitability of the system perceived characteristics to serve as a complete conceptual framework to explain the transmission of innovation, several scholars have integrated system perceived characteristics with different theoretical models to undertake empirical experiments<sup>103, 95,99,101,104</sup>.

There are several limitations that have been identified in the Diffusion of Innovation Theory. The theory has been questioned for its ability to measure complex systems and

for the fact that it applies the same attribute to all kinds of systems, whether simple or complex.

### **2.3 Review of Empirical Studies**

This section reviews previous studies that have been conducted in relation to cloud computing, digital literacy competency and how they affect library services provision.

#### **2.3.1 Cloud Computing and Library Services Quality**

Scholars have mostly given a positive review to the adoption and use of cloud computing in academic libraries. This is probably because cloud computing plays a crucial role in enhancing the effectiveness with which information services are managed, processed, and supplied. New computing technology known as "the cloud" runs on a remote server hosted on the internet and is primarily concerned with providing a service. Flexible, dynamic, and user-friendly infrastructure and software applications are guaranteed by this technology, which is primarily responsible for supplying IaaS, PaaS, and SaaS to others.

Web hosting, institutional repositories, electronic mail, mail servers, data storage, online meetings, and web conferencing are just some of the many services and applications that may be handled in the cloud. Cloud computing is also being used by libraries around the world to manage e-resources, web applications, online public access catalogues, digital libraries, statistical tools, data sets, etc. By automating some of the library's processes, this technology has the potential to save money, free up staff time, and make it simpler for patrons to find the information they need. This research was conducted to see how libraries are adapting to cloud-based services and whether or not cloud computing is generally seen as a blessing. Insights gained from this research into cloud computing and

its use in libraries will aid in the adoption of cloud technology to the advantage of those very libraries.

Researchers in India conducted a study which explored the advantages offered by cloud computing to academic libraries in the country. While all libraries face difficulties, some benefit more than others from overcoming them. 43% of the library studied agree that the investment needed on computer infrastructures can drastically reduce when a library can use cloud computing. In light of the enormous cost associated with the purchase of hardware, this sounds like a great idea for libraries. Fifty-seven (69%) of libraries report that software installation is not a problem. The platform and software are both provided and installed by the service provider. It was mentioned by 48% respondents, therefore it's clear that libraries can use cloud-based services without employing technical staff. Fifty-nine percent of library users think it's not difficult for libraries to keep their records updated. Eighty-three (54%) libraries have a favorable view of cloud based services, with the main benefit being that users have instantaneous, always-on access to their library's collections. Forty-four (28%) of the collection's citations make reference to cloud service providers' assistance with optional augmentation. About a quarter, or 34 people out of 157, gave their thoughts on whether or not the fees would be manageable. Payments will be readily within the budget of libraries. Furthermore, (50% of respondents) remark that their cloud service provider guarantees data backup on a regular basis, so they never have to worry about losing any of their information<sup>105</sup>.

In another study, researcher survey library professionals in the Kerala University Library system, India, to learn how they feel about cloud computing and whether or not they have used it before. The study adopted a survey research methodology with 102 library staff

members from the central and departmental libraries of the University representing the population. It was found that 42% of library personnel know very little about cloud computing. According to the data, the most popular cloud computing services among respondents are Facebook and Google Apps (including Gmail, Google Docs, and more). Also of interest is the fact that the library personnel at Kerala University Library are already making use of cloud computing technology without even realizing it. The knowledge of cloud service models among library personnel is minimal. This suggests that knowledge of cloud computing can also affect its use in academic libraries.

The study's primary goal was achieved through the use of quantitative research methods and an extensive literature review. Workers in the Indian library field were the subjects of the study. Information was gathered by sending a structured questionnaire to Indian professionals through various online channels (e.g., LinkedIn, Twitter, Facebook, and WhatsApp groups) and individual e-mail addresses. According to the data collected, a total of 167 experts viewed the survey and provided feedback. Google forms were utilized in the development of the questionnaire.

Another study examined whether libraries view cloud computing as a blessing or a curse for their operations. The researcher administered the questionnaire via email, forum, various WhatsApp groups, social media, and our own website. 157 people filled the online google form and share their answers and thoughts. There were 152 (96.8%) Indian respondents and 5 (3.2%) from other nations such as Pakistan, Papua New Guinea, Bangladesh, Ethiopia, and Nigeria who filled out the survey. Out of a total of 157 respondents from various institutions, 82 (52.2%) are from government institutes, 64

(40.8%) are from private institutes, and the remaining 11 (7%) are from other types of institutes such as deemed universities, autonomous institutions, and the like<sup>106</sup>.

Academic libraries in developed countries have long since moved their data to the cloud, making it available to authorized users around the clock and from any location. However, the adoption of cloud computing is still minimal in Nigeria. One of the factors that has been the cause of this low level of adoption is the security issue surrounding the use of cloud technology which is a hotly debated topic. This affects the rate at which academic library personnel in both developed and developing countries use cloud computing services. Researchers in Nigeria examined how concerns about data security in the cloud affect the uptake of cloud computing at two academic libraries in northeastern Nigeria: Abubakar Tafawa Balewa University Library (Bauchi) and Ramat Library (University of Maiduguri). Quantitative technique employing cross sectional survey design was utilized and questionnaires were used as a tool for data collection. All 328 employees at the two libraries were considered part of the population for this study, but only 144 were randomly selected as samples using the Krejci and Morgan sampling table. The data was analyzed using both descriptive and inferential statistics. The study found that specific academic libraries' adoption of cloud computing is significantly influenced by characteristics related to data security, including data integrity, data availability, data confidentiality, perceived ease of use, and perceived utility. The research concluded, among other things, that consideration of these important issues should be given greater weight when deciding whether or not to utilize cloud computing. Further research is needed to fully understand all the security concerns with cloud computing, therefore other elements related to cloud computing security should be investigated in the near future.<sup>107</sup>

Researchers in Nigeria examined how academic libraries in Kwara State, Nigeria, employ cloud computing to provide Web-based services to their patrons, focusing on the usability, friendliness, and uptake of these factors. Thirty-five (35) library personnel from three different schools in Ilorin, Kwara State, were surveyed for the study. The Pearson product moment correlation was used to test the study's hypotheses (PPMC). The results show that respondents agreed that cloud computing for providing Web-based services in academic libraries is simple and straightforward to utilize.

The results show that “software-as-a-service” (94%), platform-as-a-service (86%), Infrastructure-as-a-service (80%), network-as-a-service (86%) and data-as-a-service (86%) are the type of cloud computing. It was also found that 80% of the institutions make use of security-as-a-service for cloud computing in academic libraries in kwara state. It was also found that 94% of respondents showed that they often find it easier when they use cloud computing. This is followed by 85.7% of the respondents who showed that they do not commit errors when using cloud computing while 14.3% disagreed. Furthermore, 85.7% of the respondents indicated that they find it easier to get cloud computing to do what they want to do. Similarly, 71.4% of the respondents showed that interaction with cloud computing is easy for them to understand. Also, 71.4% of the respondents indicated that it is easy for them to remember how to perform tasks using cloud computing by consulting the user manual often when using cloud computing. The result here implies that respondents find cloud computing easier to use for delivering Web-based services. User friendliness of cloud computing. The study also found the majority of the library personnel found the cloud services user friendly. The results shows that 94% of respondents indicated that cloud computing is flexible to interact with<sup>108</sup>.

In another study conducted in Tanzania, researcher explored how library personnel at the University of Dar es Salaam library felt about Cloud Computing and what they knew about it. This study used a quantitatively descriptive research strategy. A total of 125 library personnel served as the study's population. However, a census sample strategy was used to recruit a total of 94 participants, and a single questionnaire was used for all data collection. Percentages and frequencies were calculated from the study's quantitative data supplied in tables. The study results showed that the librarians at the University of Dar es Salaam are familiar with Cloud Computing. It was reported that or 96% library personnel were fully aware of cloud computing. However, 71.3% of them did perceive cloud computing as difficult to use. This is shown in the fact that 60% of them see cloud computing in a positive light. While 35% of them reported that they not feel like using cloud computing. The implication of this is that library personnel have very positive attitude towards cloud computing it favorably, and are open to learning more about it. Therefore, it was suggested that library personnel constantly push their teams to not only be aware of new technology but also to take the initiative to put them to use. They need to make an effort to pay for employees to attend conferences, seminars, and other professional development opportunities<sup>109</sup>.

Another group of researchers investigated the level of awareness of cloud computing among library personnel in Osun state and how this affect the adoption of cloud computing. For this research, a descriptive survey approach was used. Fifty-three library personnel from four independent college libraries participated in the survey. Participants were drawn at random from four private universities in Osun State, Nigeria. Adeleke University Ede, Bowen University Iwo, Joseph Ayo Babalola University, Ikeji Arakeji,

and Redeemers' University Ede are just a few of the prestigious institutions that have been chosen. The questionnaire served as the data gathering tool. Descriptive statistics, such as frequency counts and percentages, were employed to examine the data with the help of Software Package for Service Solution (SPSS).

The results shows that most of the respondents used cloud services for private reasons. It was found that they did so in order to back up their personal images and videos. However, only 38% of them use cloud services to save collaborative work while 91% of respondents said they use it professionally to maintain/store user records and/or send out warnings to users based on SDI, just 32% said the same about the documents and office software they've generated. The study also showed that the type of cloud-based services used include mailing services ( 91%) social media, with WhatsApp outperforming Facebook and Twitter with a response rate of 10 (88.7%), and online representations via Google Docs with a response rate of 10 (88.7%). Google forms had a higher response rate (86.85%) and were used more frequently than survey monkey (84.9%), whereas YouTube (84%) was the preferred platform for sharing videos. Respondents also use Google Drive (81.1%) more than any other service for storing and sharing files, and they also use Event calendars and online file editing services.

The study also reported on the areas in which cloud computing has been implemented by the studied university libraries. Among the most popular uses of cloud computing, "Library management software (LMS)" has the greatest answer rate (88.7%), followed by "Storage of data and files," which has a response rate of (79.2%). The next most popular option, was "Back up/ storage of information resources. (81%), “Also receiving "Data import and export" and "Resource Repository" (77%). The highest percentage of

responses (40%) comes from cataloguing and classification, at 76%, while the lowest is from acquisition at 58.5%<sup>110</sup>.

### **2.3.2 Digital Literacy Competency and Library Service Quality**

The competency possessed by library personnel is a critical factor in the quality of service provided by any organization, most especially, service-oriented establishments such as academic libraries. Therefore, it is imperative that library personnel evaluate their skills especially when it comes to digital literacy competency and develop them further in order to provide optimal service. The importance of digital literacy competency can be deduced from the fact that educational institutions all over the world are prioritizing staff capacity development<sup>111</sup>. An author submitted that the continuing update of library and information professionals' competency which equip them to operate effectively in a digital environment should be the main focus of capacity building programs in the contemporary times<sup>112</sup>.

The scholar went further to advocate for training in the creation of websites, digitization, consortium collaboration, and the administration of electronic resources. Researchers in the field of library and information science agree that the information field in the digital era is undergoing rapid and continual changes. This is represented in the observation that the advancements in ICT have resulted in a continuous change of information formats and services, and therefore concluded that changes in policy, procedures, objectives, and attitudes of personnel were imperative for effective delivery of quality services<sup>113</sup>.

Researchers who studied the digital library environment in Nigeria found that unlike academic library personnel in federal universities, other library personnel such as those who work in states and national libraries rarely make use of the library's electronic

resources<sup>114</sup>. The inference is that university library staff, in contrast to their counterparts in state and national libraries, would have more advanced digital skills as well as a nuanced grasp of information users' demands and hence be more prepared for delivering superior library services. Universities in developing nations appear to downplay the significance of policy formation which is essential to digital literacy competency development. After researching the ICT gap in developing countries, scholars argued that libraries rarely conducted policy analysis or made effective use of reforms<sup>115</sup>.

It was found that only a few tertiary institutions in Nigeria had ICT strategies, despite the general consensus that library staff development is a driver for national growth<sup>116</sup>. Constant technological innovation and evolution of various tools used in information creation and management dictates that information professionals must align with the changes by repositioning themselves through continuous learning to exploit the technologies successfully and also train their clients on how to do the same<sup>117</sup>. The acquisition and promotion of digital literacy competency among library personnel is highly important in light of the ongoing costs associated with maintaining and expanding the library's collection which has often led parent organizations to frequently raise questions about the value of library services. That is why it is so important for library personnel to think outside the box so the library can make a real difference in the community. Academic library personnel, then, needs to continually improve their capabilities and performance by expanding their knowledge and abilities. Development experts have argued that insufficient resources were the primary cause of backwardness in some countries. Nigeria and other African countries are regarded as underdeveloped

due to inadequate numbers of professionals with the right knowledge, skills, and attitudes capable of driving effective behaviors and work performance.

To have knowledge is to learn about or understand something; to have skill is to be able to put that information to good use; and to have an attitude is to have a certain way of thinking or feeling about something. Capabilities were broken down into two categories: professional skills in relation to the information environment, and personal skills in the form of more generalized competencies like those involving one's attitudes and values. These two sets of abilities are intertwined because of the role that outlook plays in determining whether or not a certain technology gets adopted. Conventional library skills, such as cataloguing, acquisitions, reference, and information search skills; innovativeness, which comprises the ability to research, organize, and present information to patrons for decision making; skill with information technology; transferable and interpersonal skills generally needed for smooth and successful office management, such as skepticism; and finally, the ability to think critically and creatively about problems.

Having good manners, principles, reliability, a dedication to providing excellent service and making customers happy, the capacity to multitask, an openness to change, a thirst for knowledge, and a willingness to learn are also important. The use of information and communication technologies (ICT) has altered many aspects of librarianship, including the functions performed by library staff.

Researchers in Ghana observed that changes in the profession have a significant impact on many facets of the field. There is no geographical limitation on library services, which are constantly evolving in terms of format, acquisition, processing, and transmission of information. This has resulted in a shift in responsibilities for library personnel.

According to the findings, professionals like library personnel need to make changes to themselves and the world around them by acquiring new skills and knowledge to keep up with their expanding roles<sup>118</sup>. In today's information age, library personnel need to be up-to-date on all aspects of digital literacy competency in order to provide quality library services to patrons. This therefore reiterates the contention that digital literacy competency of library personnel is important to service quality in academic libraries.

Researchers who examined academic library personnel's service provision in Ghana observed that it is important for academic library personnel to be informed about the emerging changes in the library environment as this is crucial for effective service delivery. To emphasize the importance, it was recommended that the discovery of any skill gap in the library personnel must be tackled through adequate staff training to ensure staff commitment and capacity to deliver the best of library services in the digital era<sup>119</sup>. This can be accomplished through consistent capacity building that is also built to meet the higher standards of the information age. Because of the rapid technological changes taking place in the library and information business, library personnel should also develop their skills to keep up with the industry and its repercussions, such as the shift in information users' expectations and behavior<sup>120</sup>. It was found in a study of libraries' effects on Southwest Nigeria's privately owned tertiary institutions that library personnel and information scientists alike need ongoing training to keep up with the ever-changing information needs of their patrons. According to the research, library personnel and information professionals now need to be resourceful and imaginative in order to meet the requirements of their patrons, address issues with library infrastructure, and overcome partisan apathy toward information in the public interest.

The modern library personnel are now being expected to play different roles such as change agents, educators, and information technology experts in order for them to have a significant and positive impact on society. In order to keep up with the demands of the modern information era, it is crucial that academic libraries institute a culture of skill acquisition with emphasis on digital literacy competency even if this is limited to regular internal knowledge transfer. More library staff may take part in the training, which would improve the quality of library services without drastically affecting the library budget because the program is affordable<sup>121</sup>. Because they lack the necessary ICT skills and capacities for service delivery in this information era, advised that libraries should organize in - house training for its staff. Inevitably, this would allow library staff to tackle difficulties unique to their library's setting and provide enhanced services. Both libraries and library personnel are dynamic, evolving organisms, with recent shifts in the field being driven by advances in information and communication technology<sup>122</sup>.

A group of researchers from Nigeria investigated the changing roles of library personnel in the digital age, and they concluded that digital literacy competency acquired through continuous personnel development are crucial for ensuring the delivery of high-quality services<sup>123</sup>. The scholars submitted that library personnel in the modern day require more than basic computers and the internet skills. This suggests that they need digital literacy competency which transcend computer troubleshoot and use of application software. In this age, library personnel are seen as co-creators which means that the digital content creation skills of library personnel is essential to quality service delivery in the modern academic library. Other scholars however warn that library personnel must not simply

rush to acquire skills because they are popular but because the skills are in consonance with the demands of modern information services.

The need of a library should dictate the type of training library workers would undertake because the capacities gained will be used to supply services to suit the library's needs. It follows that library personnel whose institutions do not offer internet access or library software may not have to educate themselves in web design until such time as those services become available. Staff members should acquire or improve their skills in online cataloguing and classification to facilitate the quick and easy retrieval of library materials for patrons<sup>124</sup>. The implication here is that the impact of library personnel's' digital literacy competency is a function of how deep a library is immersed in rendering technology-based services.

In a library where the management has invested in digital infrastructure, the lack of digital literacy competency may render the infrastructure redundant. A scholar examined the value-added digital library services provided by 12 Canadian universities with 1000-5000 students and came to the conclusion that many of these institutions lacked sufficient competent people to properly use the enhanced ICT tools at their disposal<sup>125</sup>. This means that the libraries would not be able to attain the height of service quality envisaged by the management. In this day of globalization, it is crucial that library staff develop their skills in using the internet and the ability to teach patrons to do the same. This is application to Canadian library personnel as it is relevant to Nigerian library personnel.

Nigerian scholars evaluated competitive service delivery by library staff in tertiary institutions in the digital era, they confirmed that when library staff can skillfully navigate the web, they will be able to teach their users same, thus enabling library

personnel to provide value-added services. However, the reality on the ground is that only a few library personnel are skilled in the use of the internet enough to be confident of their ability to teach the students, many of whom are digital naives<sup>126</sup>. The implication is that library personnel in academic libraries defer to students when it come to the navigation of the cyberspace which mean that the library is unable to offer help to even those who might need help in acquiring digital literacy competency because of the general perception of the library as an institution that are not technology compliant.

It appears that the importance of library personnel in the supply of information services in the modern day is at risk. Researchers who conducted a survey of ICT use in Nigeria's National Open University Libraries, respectively, found that "poor infrastructure, lack of quality resources, and low morale of many library personnel in many university libraries have made information resource centers to be relegated to the background. Because of this, other information providers with advanced knowledge of ICT appear to be more pertinent to those in search of information<sup>127</sup>.

To continue serving as the community's trusted source of information, library staff members will need to hone their skills particularly as regards to digital literacy competency. According to an assessment of Canadian university libraries, the ever-changing nature of Canada's educational landscape necessitates that academic acquire new knowledge and hone their abilities to better serve students<sup>128</sup>. Knowledge exchange in the digital age will only be effective if libraries use information technology to depict their global presence<sup>129</sup>. Library personnel have accepted that the use of information technology has transformed the globe into a global economy dependent on creative

approaches to data organization and dissemination<sup>130</sup>. Anyone who wishes to operate in this field therefore must acquire the required skills.

Failure to acquire the necessary digital literacy competency does not only affect the ability of the library personnel to provide essential services in the modern digital age, it is also problematic in a number of ways. Librarians without digital literacy competency in libraries with digital ambitions risk being laid off as a result of redundancy. The importance skills development for academic library personnel lies in helping them to adapt to the demands of the digital age<sup>131</sup>. In today's digital age, traditional library services provided by staff members who are not familiar with information and communication technology are no longer in high demand. Many information users had developed skills that allowed them to independently perform tasks that would have previously been performed by library staff. Many libraries are in this predicament, which helps to explain the dramatic drop in library patronage in academic institutions where studies are routinely undertaken and where it is necessary to regularly seek out information to back up generated data.

The only way the library's user base can be restored and expanded is if staff members actively work to reverse the trend, first by examining their own shortcomings and failings, and then by developing the skills necessary to adapt to the ever-evolving technological landscape. However, the effort of library personnel in Nigerian to acquire digital literacy competency or to apply the acquired skills to improve library service quality is often affected by institutional factors. Researchers looked at the internet use of library personnel at the Ibrahim Babangida Library in Yola, Nigeria, and discovered that power outages severely reduced internet access. As a result, in today's digital age, a lack of

electricity would limit the library staff's ability to efficiently provide services to patrons<sup>132</sup>. Capacity building, including training and retraining, will benefit greatly from the implementation of sound policies. In addition to enhancing library service, good policies would help strengthen library principles and procedures.

This is supported by the findings of another scholar who argue that in order for poor nations to thrive in the digital era, they must prioritize training and adapt their policies to reflect this. The research criticized how many libraries had a formal plan to improve their facilities and train their employees<sup>133</sup>. Weakness in library and information institutional capacity has indications including poor work environment, inadequate working facilities, and frequent power outage, according to research<sup>68, 69</sup>. Capacity building is associated with improved skill acquisition and multitasking<sup>134</sup>. Employee growth is a positive side effect, as is the library's ability to better fulfil its goal and vision. Libraries around the world are increasingly adopting ICTs to enhance service offering to suit users' expectations in the increasingly competitive library environment. Effective service delivery is done by properly trained personnel, nevertheless, a lack of resources is a major barrier to training programs in many organizations including academic libraries<sup>135</sup>. A study of library employees' readiness to provide 21st-century global services, concluded that value-added and modern service provision is determined by the cultural attitudes of staff, such as a lack of enthusiasm for capacity building and a reluctance to abandon traditional practices in favor of more up-to-date ones<sup>136</sup>.

There is no doubt that in this modern period of rapid technological development, the ability to use information and communication technologies (ICT) effectively is essential in every aspect of human endeavor. The advent of the digital age has altered many

aspects of society, including the way libraries are used. According to a scholar who research into the networking abilities of library personnel at the University of Nigeria, Nsukka, there is a shift from print literacy to computer literacy, and ICT-enabled services like web 2.0 services have made it crucial for library personnel to have advanced internet proficiency in order to manipulate the computer/internet/networks in order to enable communication with users via e-mails, social groups, and so on<sup>137</sup>. They called this skills internet literacy which is an integral part of digital literacy competency

In today's technology era, academic library personnel must have the skills to effectively handle online material and critically evaluate the reliability of their sources. In order to compete with other information providers who are often highly skilled in the manipulation of ICT, library personnel members must develop their network literacy skills. Library personnel should acquire information and communication technology skills proportional to the responsibilities they have in furthering the library's mission through its service to patrons.

However, this is not the situation with several tertiary institutions in Nigeria. Many library personnel in Nigerian academic libraries were reported to have basic computer skills. They have experience with word processing and electronic mail but are unfamiliar with browsers other than Google and Yahoo. In addition, they also lack the advanced internet navigation skills that would have set them apart from the library users.<sup>138</sup> This indicates that the library personnel were unable to provide satisfactory services to the patrons who relied on them especially when it comes to online information resources. Researchers have pointed out that Nigerian library personnel have to acquire and develop digital literacy competency because majority of them were trained in the provision of

traditional, manual library services and majority of the libraries where they work are just developing digital infrastructures. This indicates that a library personnel's digital literacy competency for the provision of library services are not predetermined by his/her rank or working experience unless he gains and improves these skills. It was however noted that majority of the experienced library personnel are often reluctant to acquire digital literacy competency, this is in contrast to younger library personnel (those with less than fifteen years of experience) who have been observed to make more of an effort to learn about and use information and communication technologies. However, research indicated that 56.9% of the questioned library employees blamed a lack of ICT skills on a lack of experience<sup>139</sup>.

Despite the best efforts of the library personnel, there are times when external factors prevent them from expanding library services. Among library staff at Ahmadu Bello University in Zaria and Kaduna State Polytechnic in Kaduna, Nigeria, it was found that digital skills acquisition training was often hampered by erratic power supply and high cost of training, work overload, absence of encouragement, lack of experience, and insufficient training in LIS schools<sup>76</sup>. Nonetheless, those who managed to experience the training improved the overall level of service offered.

Academic libraries without personnel with the appropriate level of digital literacy competency is at a disadvantage in the information age. The impact of digital skills on service delivery by library staff in higher institutions in Lokoja, Kogi State, Nigeria was studied by a group of researchers who found that lack of resources, insufficient training, negative attitudes among staff, and an uncondusive environment were the major barriers to ICT skill acquisition. The study found that library personnel in the libraries lack the

required level of digital literacy competency and urged that they should make an effort to learn more and remove any barriers they encounter in order to provide better service to library users<sup>140</sup>.

The researcher added that the acquisition of digital literacy competency improves the self-efficacy of library personnel and give them the needed confidence to passing on their knowledge to others, which will help their parent organization achieve its objectives. When considering how academic libraries may best serve their patrons in the modern digital era, the researchers concluded that staff training in the use of digital devices is essential.

In addition to training and development, evaluation of present digital skills will help library employees understand their current knowledge, competence, and motivation to further improve these qualities for more efficient and effective service delivery. In today's digital age, offering great library services requires a high level of digital literacy competency.

Another set of scholars concluded that many African academic library personnel have seen the need to improve their digital skills in order to better serve their clients<sup>141</sup>. This argument is supported by research undertaken by researchers at Benue State University, Nigeria, evaluating the use of electronic resources by students majoring in library and information science. They determined that most libraries do not have enough employees with the appropriate level of technological knowledge. This suggests that library employees have been falling short of students' expectations, and that they should make efforts to hone their digital skills in order to better serve library users<sup>142</sup>.

A group of Indian researchers conducted an evaluation of library personnel's abilities at Visvesvaraya Technological University in Karnataka, India. It was found 86% of the library personnel surveyed had responsibilities related to information and communication technology, while 13% did not. The lack of ICT skills among the minority of library personnel who did not execute ICT-related duties raises questions regarding the interconnectedness of the employment<sup>143</sup>. It is important that all library personnel be given the opportunity to acquire digital literacy competency and apply such in their given tasks in the library. This is not currently the case in many African academic libraries

Researchers have reported that, on average, only 58% of library personnel possess some level of digital literacy competency. This could unintentionally reduce the quality of library services. Because no one can work above his or her capabilities, the library personnel can only give a sufficient level of service<sup>144</sup>. The people without digital literacy competency are structurally excluded from participating in the activities carried out by those who have the digital skills a scholar found that library personnel that are skilled in the use of ICT for service delivery have a shared bond with their customers after completing an in-depth examination of library users' needs in the digital era. Due to his sway over their data access, he has earned a certain status.

They believe he has a solid foundation in information and communication technologies and can compete well with other sources of data in the digital era. As a result, the digital library's patrons will feel more connected to the library personnel and be more likely to rely on him for their information needs. According to Pakistan researcher, library personnel in Pakistan universities and colleges do not have adequate digital literacy competency which has hampered their abilities to provide high quality services to the

library patrons<sup>145</sup>. This challenge seems to be peculiar to developing countries where library personnel often receive training deficient in the use of technology for library services.

However, researchers in Nigeria have shown that lack of digital literacy competency among library personnel can be overcome. They found the use of various technologies for library services is on the rise in Southeast Nigeria's libraries because the library personnel possessed strong digital literacy competency which they acquired as a result of formal and informal education, workshops, in-house training, assistance from colleagues, and seminars. It was determined that the available skills were sufficient to deliver superior library services.

In-house IT resources' usefulness and accessibility may play a role in determining how many library employees possess the requisite ICT skills. As part of their study of ICT infrastructure and utilization by library personnel in universities in Benue State, Nigeria, researchers discovered that the Federal University, Benue state had the most functional ICTs compared to the State University and the private university had the least functional ICTs<sup>146</sup>. The library staff's technological expertise, however, followed the same trend. Private universities rank worst in terms of efficient service provision since their students are unable to reach their full potential in such an unsupportive environment.

In a related study, it was found that despite the fact that 85% of library employees in universities in Benue State, Nigeria, had basic computer skills, only about 57% of library workers possessed digitization ability (scan, upload images and use power point). It is possible that library employees lack the networking and programming skills necessary to make efficient use of today's information and communication technology, making it

impossible for the library to offer value-added services to its patrons. In the end, they concluded that the library staff did not have the necessary digital literacy competency to implement the necessary services demanded by modern information services consumers<sup>147</sup>.

Due to the widespread usage of digital technology, it is essential that library staff members have solid networking skills. The time and scope at which services are delivered will be increased. This was verified by the investigation conducted into the effects of ICTs on library cataloguing and classification in the Nigerian state of Akwa-Ibom. They found that even though most library personnel only utilize ICT for cataloguing sometimes, 82% do so nevertheless. Frequent power failures and software upgrades were, however, blamed for the low library patronage and not the level of digital literacy competency of the library personnel. This indicates that if Nigeria's electricity and information technology infrastructure are adequately maintained, library staff there will be able to learn and effectively apply ICT-related skills, resulting in better library service for everyone<sup>148</sup>. Digital literacy competency is also important if academic libraries aim to provide inclusive services that does not put any patron at a disadvantage.

A researchers suggested that digital literacy competency is essential in providing digital library and information services for the blind. It was stressed that making library resources available in a format that is usable by the blind is highly important<sup>149</sup>. This will require library personnel with appropriate digital literacy competency. However, it has been observed that service delivery to the disabled is not typically considered a priority in third world countries and, as a result, is not typically included in library budgets, as shown by research conducted at the University of Limpopo in South Africa on the

suitability and availability of library services for disabled scholars. Only a minority of libraries in Nigeria offer services for the blind, according to a scholar who studied the availability of higher education for people with disabilities in the country<sup>150</sup>.

In today's current digital environment, it is essential for academic library personnel in Nigeria to have in-depth knowledge of a wide range of the digital literacy competency. This will enable them to thrive in the competitive world of information and communication technology, provide high-quality, cutting-edge library services, and instill users with unwavering faith in their talents as they adapt to the ever-changing technical landscape of the library. The ever-evolving status of technology and library operations, such as the collection, classification, and dissemination of knowledge, provide support for this assertion. These changes have had a significant effect on information processors and library personnel.

Organizations such as libraries has pointed out the need for academic library personnel who are experts in the use of a wide range of ICT to package and re-package information products and services in a way that is user-friendly and accessible in order to compete in the information marketplace. In research analyzing the unique expertise of library personnel in the digital age, the researchers suggest that the advent of digital tools in the library has altered library personnel's responsibilities from providing information to building capacity. They also highlighted the need for library personnel to have digital literacy competency and the ability to publicize library services in order to attract and keep consumers in the face of fierce competition from other information resources<sup>151</sup>.

When library personnel fail to display any skills in the use of digital technology, library patrons may conclude that the library is ineffective and turn to other resources, such as

the internet, where library personnel have no say over the information presented. Globally, libraries have been transformed by the use of technology in education. Database upgrade procedures, library structure, and library consortia are only a few examples of how ICT has affected service provision in academic libraries<sup>152</sup>. The use of digital channels has substantially improved the electronic exchange of information with customers. The use of computers and other forms of information technology to supplement and even provide instruction is already commonplace and will continue to change the face of higher education around the world<sup>153</sup>. They underlined that there are many technological alternatives to librarianship, therefore modern library personnel must be adept at juggling these two philosophies while maintaining a student-first service philosophy and a focus on the needs of their patrons.

According to the findings of another study, library personnel use information and communication technologies (ICTs) such as the internet, databases, and electronic facilities to further library missions, manage library information systems, and increase library accessibility. More than half of the libraries we surveyed reported that patrons rarely used their library's information and communication technology (ICT) to borrow books<sup>154</sup>. In 2017, a researcher investigated the restricted financing for ICT and the possible use of it to provide library services in universities in Cross River State Nigeria. Despite discovering that 94.2% of participants criticized the amount of money supplied, 88.5% of participants accepted that finance was provided consistently by the management. The library was unable to deliver effective services or upgrade to cutting-edge library management software due to financial constraints.

All of respondents (100%) to a survey conducted reported that the most important benefit of information and communication technologies is the reduction of unnecessary work (98.1 percent)<sup>155</sup>. Most African libraries have not been sufficiently influenced by ICT to improve successfully on service delivery. They also complained that library employees are expected to instruct customers but are ill-equipped to do so. Nigeria scholars found that many libraries in developing countries lacked adequate information and communication technology (ICT), which they attribute to a shortage of library personnel trained in ICT. There are numerous ways in which the use of digital technologies improves the library's personnel's ability to serve library users. Previous studies have revealed that library personnel in the modern days need digital literacy competency mostly for resource procurement, cataloguing, and general internet use<sup>156</sup>.

A study reported that library personnel at Nigeria's National Open University use digital technology for a variety of tasks, including cataloguing and circulation, as well as indexing, bibliographic checking, and spine labelling. The study however that the digital-related tasks performed by the library personnel are limited to information materials processing. For instance, it was observed that they render no digital reference services which could hamper the provision of cutting-edge services to information who choose to access the information resources via the web. It is simple to assume that the reason why the reserves were limited is due to lack of the required digital literacy competency. Once again, digital literacy competency has affected the library services rendered.

Special libraries serving scholars in engineering, arts, and sciences were surveyed to determine their staff's familiarity with digital resources and digital collaboration tools. It was found that a majority of library staff liked and used open-source software. However,

78% of the library personnel admitted that they need technical support for customizing the software so that they can maximize its use. This suggests that the library personnel lack the necessary skills to independently use and maintain the software. To prevent being held at ransom by software experts, the author recommended that the digital literacy competency of library staff must be developed in the maintenance/manipulation of technologies so as not to be fully dependent on staff outside the university<sup>157</sup>.

It appears that the range and quality of services provided by library personnel in specialty libraries is greater than what is obtainable in other types of libraries. One possible explanation is because their services are unique and so must adapt to the needs of their individual consumer. Internet/database searches and retrieval; selective dissemination of information (SDI); electronic delivery of documents; web-based catalogue maintenance; inter-library loan; these are just some of the many services provided by library staff using ICTs reported by a scholar who conducted a survey of staff development in special libraries in Oyo state. Other services include reference assistance (in-person and digital), book lending, indexing, abstracting, publishing, alerting, and archiving<sup>158</sup>. This suggests that the need for digital literacy competency is more pronounced among special library personnel than others.

Researchers analyzed the efficiency with which library staff at two Nigerian agricultural universities used information and communication technologies in their work. It was found that they used the computers for record-keeping (53%), entertainment (30%), and research (16%). However, it was found that the libraries were only partially automated and lacked online cataloguing and e-acquisition. Moreover, administrative activities were performed manually. This suggests that the library staff was woefully unprepared to offer

modern services in line with what customers expect in the digital world<sup>159</sup>. The basic digital infrastructure available in this library limits the ability and the motivation of the library personnel to acquire digital literacy competency which also limit the range of services they can offer.

A scholar from Ghana claimed that 95% of academic library personnel in Ghana agreed that capacity building improved service provision, that staff members' skills were updated, and that trained staff members delivered better services than untrained staff members<sup>54</sup>. This suggests that libraries in Africa are aware of the necessity of digital literacy competency and some are making the necessary efforts to improve the skills of their personnel while others have remained with the traditional services which is gradually taking them out of reckoning among information users especially in the academic environment.

A study surveying 60 library personnel at the Babs Fafunwa Library at Adeyemi College of Education in Ondo, Nigeria, found that 20% reported that digital technology had a "maximal" impact on their productivity on the job, 14% reported that it had a "reasonable" impact, and 31% reported that it had "minimal" impact. Thirteen (45%) had official ICT training, while sixteen (55%) did so informally<sup>160</sup>. The implication of this results is that there are still many library personnel who would deny the importance of digital literacy competency to cover for their lack of these skills and perceived inability to acquire the skills.

According to a survey conducted on the use of ICT by library staff at the University of Dar es Salaam, Tanzania, the use of ICT has increased the inventiveness of the library staff in service delivery. Among the cutting-edge ICT offerings are the migration from

paper-based to digital services, the provision of digital facilities/databases, the establishment of an electronic platform for users' suggestions, the provision of access to Quick-Response codes, the development of a system through which users can pose questions and receive answers from library personnel, the use of social media such as Facebook and Twitter, the introduction of virtual reference tools, the delivery of online trainings for users, and the establishment of institutional repositories<sup>161</sup>. These advancements have allowed libraries to provide their services more quickly, accurately, and efficiently. The new services have also made it simpler for employees to carry out their responsibilities. It was proposed that the library provide more services by training more people both in and out of the country and by providing refresher courses on automation and electronic resources.

The influence of digital literacy competency in improving the quality of library services cannot be over emphasized. A scholar observed that modern library personnel rely on various digital technologies to provide a wide range of services to patrons. Teaching students and lecturers to conduct their own internet and database searches is an admirable contribution<sup>46</sup>. This would have the effect of making library staff more valuable, which in turn might increase library usage. This however demand that the library personnel who would perform these tasks are themselves digitally competent.

Library infrastructure and staff are major factors in providing value-added services, as confirmed by another scholar. In other words, the ability of library staff to effectively utilize these technologies and to think creatively is just as important as the deployment of cutting-edge technologies in today's information age. Libraries' use of ICTs has resulted in the supply of new services, such as the online catalogue and electronic dissemination

of information. The library, for example, now acts as a guide and facilitator by offering access to external servers, such as publisher websites or database supplier services. There has been a rise in the popularity of e-books, and open content has also gained prominence. The price of course supplies for those who use these has been drastically lowered<sup>162</sup>.

It is crucial that library staff provide quality services to people of all backgrounds and ages and digital literacy competency is important in achieving this. An assessment of academic library services for the visually impaired found that digital tools are utilized for organizing information, managing information systems, sharing resources, and delivering documents. Thanks to advances in information and communication technology, library personnel may now serve patrons with some physical impairments as well as those who are located in far-flung areas and who would find it difficult to visit the library regularly<sup>163</sup>.

A group of scholars looked at the internationalization of library services in Nigeria and reaffirmed that the development of ICT has allowed libraries to shift their focus from individual ownership to the provision of services to a wider audience. It is no longer necessary for users to physically visit the library in order to borrow materials. The expansion of users' access to materials, both those owned by their local library and those owned by other libraries but accessible via remote servers, is a positive result of this trend. There has been a shift in how library services are delivered. Effective library services require staff with a wide range of computer skills<sup>164</sup>.

Technology has spawned new methods of service delivery and innovative services, as stated by scholars who studied the availability of online resources in Nigerian universities. Better cataloguing and classification processes have been implemented, thanks to online

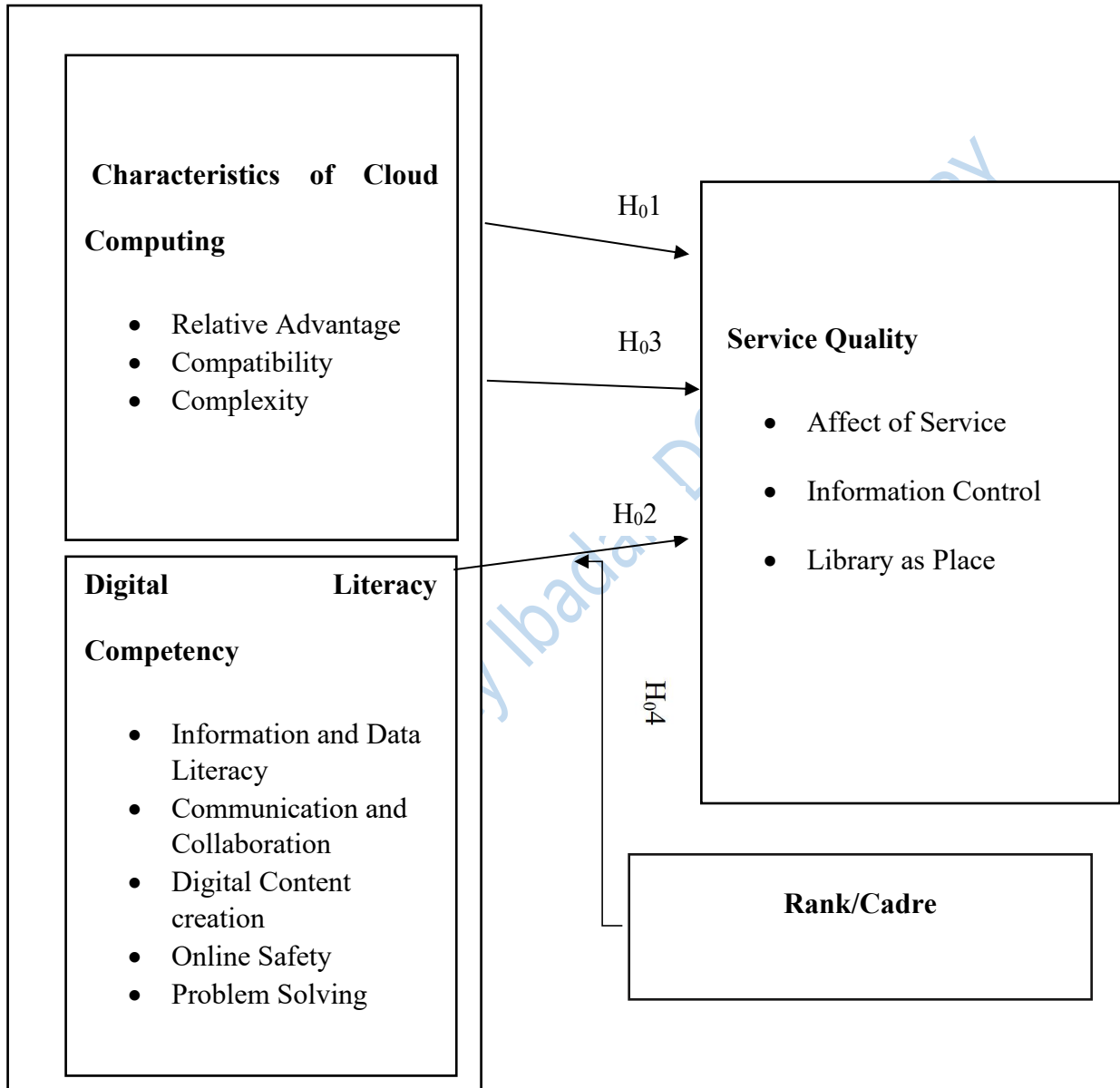
cataloguing in Nigerian university libraries<sup>165</sup>. Another set of researchers looked at the use of online cataloguing in Nigerian libraries and found that it was widely used by Nigerian libraries<sup>166</sup>. The use of library blogs (social media) for direct engagement with users is one of the most appreciated library services in the modern period, according to research conducted by a researcher at the Agricultural University of Athens and the University of Piraeus in Greece. As one of the quickest methods of document delivery and selective dissemination of information, this is a fantastic advancement in library services<sup>167</sup>.

Lead City University Ibadan DO NOT COPY

## 2.4 Conceptual Model

### Independent Variables

### Dependent Variable



**Figure 2.4: Conceptual Model on cloud computing, digital literacy competency and library service quality. (Source: Researcher)**

The conceptual framework outlines all the variables in the study. the dependent variable is library service quality which is measured by constructs adapted from the Libqual framework, namely; affect of service, information control, library as place<sup>102</sup>. The affect of service construct has to do with whether the services and collection is satisfactory to the user or whether it is frustrating to them. The information control has to do with the proper organization and accessibility of the resources and services in the library while the library as a place construct measure the friendliness of the library building and environment (physical and digital) to the users. All of these can be affected by the independent variables; characteristics of cloud computing and digital literacy competency of library personnel.

Characteristics of cloud computing is measured by system characteristics outlined in the Innovation Diffusion Theory (IDT). These constructs, as adapted from the original theory, are relative advantage, complexity and compatibility<sup>56</sup>. The study holds that the adoption of cloud computing by libraries can only happen when library personnel and libraries believe that it offers better advantage compared to other technologies they are currently using. Also cloud computing will be adopted if it is seen as easy to use and when it is compatible with the way the library is already operating. For instance, the library that has not installed a library management software or do not have digital resources may not see the need to adopt cloud services.

Another variable that can contribute to library service quality is digital literacy competency of library personnel. Digital literacy competency in this study is measured by construct from the Digcomp 2.0 framework developed by the European Union. The constructs, as adapted from the framework, are; Information and Data Literacy;

Communication and Collaboration; Digital Content creation; Online Safety, and problem Solving<sup>93</sup>. This framework suggests that a digitally literate library personnel should be able to understand all matters relating to the creation, storage, retrieval, and use and sharing of information and data. The library personnel should also be able to use digital technology for the purpose of communication and collaboration and also create digital content which he/she will share with others through the internet institutional repositories. In addition, the library personnel must also be aware of what is called netiquette, how to behave online, how to safeguard information from hackers and other related skills. Most importantly, the library personnel should be able to solve problem that they face or their client. The framework also put it on library personnel that they should not only be able to acquire these skills but also able to teach their clients and help them acquire the skills.

In this study, both cloud computing adoption and digital literacy competency are expected to influence quality of service in term of affect of service, information control, and library as place. The use of cloud computing and digital literacy competency can influence affect of service by allowing users to access information easily and quickly. It can also influence information control by keeping information resources organized and to provide various online tools that can help information user's retrieval. In the same vein, these variables can also affect the perception of library as a place (physical & digital) through the saving of library space for users so that the library does not become cluttered with unnecessary information resources.

## **2.5 Summary of Gaps in Literature Reviewed**

The review of literature has shown the state of the art as regard to the focus of this study. the review of literature has shown that library services quality is now an issue to be

judged by library users and the verdict is usually that library services is below expectation due to the overtly reliance on traditional methods of delivering services. Library user in the modern days are interested in quick, updated and stress-free services. They are now comparing the services rendered by libraries to that of other information services providers who are based online. Measuring the library against these services providers is always bound to cause issues as many libraries, especially in Africa, have not reached the level of automation achieved by online media. This is why technologies such as cloud computing has been highly recommended for libraries.

Cloud computing has become accepted worldwide in all areas of human endeavor including libraries. There are virtually no occupation in the world that do not find a cloud service relevant to its needs. Indeed, there are specific cloud services aimed at libraries such DuraCloud, OCLC web services that library personnel are already using for library routines such as cataloguing, classification, reference services and circulation which libraries all over the world are now using. Studies have shown the perception of system characteristics of cloud computing differs among library personnel in Nigeria.

Nigerian library personnel perceive several advantages of cloud computing in their professional practice. Cloud computing provides Nigerian library personnel with the opportunity to store and access resources and services from anywhere and at any time. This flexibility allows library personnel to cater for the needs of their users remotely, ensuring uninterrupted access to information. Cloud computing also eliminates the need for significant upfront investments in physical infrastructure and hardware. Nigerian library personnel recognize the potential cost savings associated with cloud computing as

they can avoid expenses related to server maintenance, software updates, and data storage facilities. This allows libraries with limited budgets to allocate resources more efficiently.

Cloud computing enables Nigerian library personnel to collaborate and share resources more easily with other libraries, institutions, and even users. The cloud platform facilitates seamless collaboration on projects, resource sharing and collective efforts to provide enhanced services to library users. Nigerian library personnel also appreciate the scalability and flexibility offered by cloud computing. Cloud-based solutions allow libraries to scale up or down their computing resources based on demand, ensuring efficient resource allocation. This flexibility enables libraries to adapt to changing needs without significant disruptions or additional costs.

Another related advantage discussed in the literature is that Cloud-based tools and applications streamline workflows and routine tasks, leading to increased efficiency and productivity among Nigerian library personnel. With cloud computing, library personnel can automate cataloguing processes, streamline interlibrary loan services, and implement effective data management practices. Nigerian library personnel recognize that cloud computing allows them to leverage technological advancements and innovations. Cloud-based solutions often provide regular updates and access to the latest features and functionalities, enabling library personnel to stay up to date with emerging trends and technologies in the field. This has raised interest in cloud computing among many library personnel in Nigeria.

Cloud computing adoption in Nigerian libraries has been a topic of interest within the literature. Cloud computing refers to the use of remote servers on the internet to store, manage, and process data, providing on-demand access to resources and services.

However, the use of cloud services is just taking root in Nigerian academic libraries due to various issues such as data security, attitude of library personnel, and available infrastructure which has limited the ability and willingness of libraries to use cloud computing. Another factor is the skill among library personnel. It was found that many library personnel are not using cloud computing because of inadequate skills. Several studies have explored the adoption of cloud computing in Nigerian libraries and its potential benefits.

Research has shown that most libraries in Nigeria were not aware of cloud computing and its potential benefits, and those that were aware faced challenges such as inadequate infrastructure, lack of technical expertise, and security concerns. In addition, while some libraries in Nigeria had started to adopt cloud computing, many were still at the early stages of adoption. For the few who have started using cloud computing, the adoption had improved access to library resources, enhanced collaboration, and reduced costs.

Overall, the literature suggests that cloud computing adoption in Nigerian libraries is still at the early stages, with many libraries facing challenges such as inadequate infrastructure, lack of technical expertise, and security concerns.

The review of literature showed that digital literacy competency skills of library personnel in Nigeria has been a topic of interest within literature. Several studies have explored the current state of digital literacy competency among library personnel and have highlighted the challenges they face in adapting to the digital era. It can be inferred from the literature that, some library personnel had acquired digital skills through training and self-study. The findings indicated that these library personnel had digital literacy

while others struggled with advanced digital skills. The summary is that majority of Nigerian library personnel often demonstrated proficiency in basic digital skills.

Generally, they lacked advanced knowledge in areas such as information retrieval, digital preservation, and data management. Studies reviewed indicated that many still face challenges in adapting to emerging technologies. It emphasized the need for continuous professional development programs to enhance library personnel's digital literacy competency. The literature identified limited access to training opportunities and inadequate technological infrastructure hindrance to library personnel's digital literacy competency.

Overall, the literature on the digital literacy competency of library personnel in Nigeria highlights the challenges they face in acquiring and applying digital skills. While some library personnel demonstrate proficiency in basic digital literacy, there is a need for continuous professional development programs and institutional support to enhance their digital literacy competency. Adequate training opportunities, access to digital resources, and improved technological infrastructure are crucial factors in bridging the digital divide among Nigerian library personnel.

The inadequate skills of library personnel is also manifested in digital literacy competency. The digital literacy competency need in the modern day is far larger than what is understood by many library personnel in Nigeria. Library personnel are no longer expected to be passive users of technology, they are rather expected to be able to teach library users in the responsible use of technology. They are also expected to become co-creators of knowledge, publishers and online editors. With the rise of cyberbullying and

other vices such as online fraud, library personnel are expected to play great roles in helping others stay safe in the cyber space.

The review of literature revealed that there is little study that focused on the impact of both cloud computing and digital literacy competency on the quality of library services.

This is probably due to the fact that both concepts are still new to Nigeria.

Lead City University Ibadan DO NOT COPY

## Endnotes

1. S., Shaheen, & A. Cohen, *Shared Ride Services in North America: Definitions, Impacts, and The Future of Pooling*. **Transport Reviews**, 39(4), 2019. 427-442.
2. S., Sivesan, *Factor Analysis of Perceived Service Quality of Hospitality Industry in Jaffna District: An Application of SERVQUAL Model*. **Global Journal of Management and Business Research: G Interdisciplinary**, 20 (4): 2020.36, 43.
3. G. Medberg, & C., Grönroos, *Value-In-Use and Service Quality: Do Customers See a Difference?* **Journal Of Service Theory and Practice**, 30(4/5), 2020. Pp.507-529.
4. D.A., Xudoyberdiyeva, *Management of the Services Sector and its Classification*. **Theoretical & Applied Science**, (10), 2019. Pp.656-658.
5. S.P., Osborne, *From Public Service-Dominant Logic to Public Service Logic: Are Public Service Organizations Capable of Co-Production and Value Co-Creation?* **Public Management Review**, 20(2), 2018. Pp.225-231.
6. D., Buhalis, T., Harwood, V., Bogicevic, G., Viglia, S., Beldona, & C. Hofacker, *Technological Disruptions in Services: Lessons from Tourism and Hospitality*. **Journal of Service Management**. 2019.
7. O., David-West, N., Iheanachor, & I. Umukoro, *Sustainable Business Models for The Creation of Mobile Financial Services in Nigeria*. **Journal of Innovation & Knowledge**, 5(2), 2020. 105-116.
8. P. Chewe, *Enhanced Library Services Through Social Media In The Age Of Covid-19 Pandemic: An Anecdote Of Academic Libraries In Zambia*. **Library Philosophy and Practice**, 2020. 0\_1-13.
9. M. A., Wong, & Saunders, L. (Eds.). *Reference and Information Services: An Introduction*. ABC-Clio. 2020.
10. A.S., Cristobal, *Expectations on Library Services, Library Quality (Libqual) Dimension and Library Customer Satisfaction: Relationship to Customer Loyalty*. **Library Philosophy and Practice (E-Journal)**, 1706, 2018. Pp.1-24.
11. O., Cephas, M. S., Wanyonyi, & G. S. Sikolia, *Effect of Library Services on The User Satisfaction at Pwani University Library*. **The Strategic Journal of Business & Change Management**. Vol. 5, (3), 2018.Pp 935 - 951,

12. R. K. F., Ip, & C. Wagner, *Libqual+® As A Predictor of Library Success: Extracting New Meaning Through Structured Equation Modeling*. **The Journal of Academic Librarianship**, 46(2), 2020. 102102.
13. J., Linden, S. Tudesco, & D., Dollar, *Collections as a Service: A Research Library's Perspective*. **College & Research Libraries**, 79(1), 2018. P.86.
14. J., Cox, *Positioning the Academic Library Within the Institution: A Literature Review*. **New Review of Academic Librarianship**, 24(3-4), 2018. Pp.217-241.
15. S., Hart, & H. Amos, *The Library Assessment Capability Maturity Model: A Means of Optimizing How Libraries Measure Effectiveness*. **Evidence Based Library and Information Practice**, 13(4), (2018). 31-49.
16. D., Mckay, S., Chang, Smith, W., & Buchanan, G. *The Things We Talk About When We Talk About Browsing: An Empirical Typology of Library Browsing Behavior*. **Journal Of the Association for Information Science and Technology**, 70(12), 2019. 1383–1394.
17. P., Bhanu, & J. Manoj Kumar, *Assessing Library Service Quality at Baba Farid University of Health Sciences (Bfuhs), Faridkot: A Libqual+™ Study*. **Journal Of Knowledge & Communication Management**, 7(1), 49–64. <https://doi.org/10.5958/2277-7946.2017.00005.5>
18. A., Kumar, & P. Mahajan, *Evaluating Library Service Quality of University of Kashmir: A Libqual+ Survey*. **Performance Measurement and Metrics**. 2019.
19. A.S., Cristobal, *Expectations on Library Services, Library Quality (Libqual) Dimension and Library Customer Satisfaction: Relationship to Customer Loyalty*. **Library Philosophy and Practice (E-Journal)**, 1706, 2018. Pp.1-24.
20. S. A., Raza, A., Umer, M. A., Qureshi, & A. S. Dahri, *Internet Banking Service Quality, E-Customer Satisfaction and Loyalty: The Modified E-Servqual Model*. **The TQM Journal**. 2020.
21. Y., Liu, P., Wang, M. L., Thomas, D., Zheng, & S. J. Mckirdy, *Cost-Effective Surveillance of Invasive Species Using Info-Gap Theory*. **Scientific Reports**, 11(1), 2021. 1-7.
22. M., Pekkaya, Ö., Pulat İmamoğlu, & H. Koca, *Evaluation of Healthcare Service Quality Via Servqual Scale: An Application on A Hospital*. **International Journal of Healthcare Management**, 12(4), 2019. 340-347.
23. C. H., Wu, Y. H., Yuan, & S. B. Tsai, *Using The Dematel Model to Expose Core Causal Items of Libqual for Improving Library Service Quality: From the Perspective of Big Data*. **Soft Computing**, 24(8), 2020. 5729-5739.

24. S.O., Alabi, *Use of Electronic Resources by Undergraduates in Selected Private University Libraries in South West Nigeria*. **African Journal of Library, Archives & Information Science**, 31(1). 2021.
25. M., Taylor, M. E., Pratt, & R. A. Fabes, *Public Libraries as A Context for The Study of Learning and Development*. **Journal Of Higher Education Outreach and Engagement**, 23(2), 2019. 51-62.
26. M. Ashiq, *Measuring Library Service Quality of The College Libraries in Pakistan: An Analysis of the Libqual Comments*. **Library Philosophy and Practice**, 2020. 1-24.
27. B. B., Ashiru, A., Muritala, O. A., Awujoola, & O. O. Bayowa, *Electronic Information Resources Use, Quality Reference Service Delivery and Academic Performance of Final Year Students in Colleges of Education in Lagos State, Nigeria*. **Library Philosophy & Practice**, 2022.
28. W. O. Anyim, *E-Library Resources and Services: Improvement and Innovation of Access and Retrieval for Effective Research Activities in University E-Libraries in Kogi State Nigeria*. **Library Philosophy and Practice**, 2018. 0\_1-21. E
29. A.S., Cristobal, *Expectations on Library Services, Library Quality (Libqual) Dimension and Library Customer Satisfaction: Relationship to Customer Loyalty*. **Library Philosophy and Practice (E-Journal)**, 1706, 2018. Pp.1-24.
30. T. D., Rizky, N., Huda, M., Muslikh, & N. Rini, *Analysis (Libqual) on Loyalty and Library Satisfaction; A Case Study in Yarsi University Library Service Center*. **Journal Organisasi Dan Manajemen**, 16(2), 2020. 182-195.
31. C. H., Wu, Y. H., Yuan, & S. B. Tsai, *Using The Dematel Model to Expose Core Causal Items of Libqual for Improving Library Service Quality: From the Perspective of Big Data*. **Soft Computing**, 24(8), 2020. 5729-5739.
32. E.S., Abdoh, *Library Anxiety Among Omani and Saudi Arabian International Students: A Case Study at The University Of South Carolina, USA*. **The Journal of Academic Librarianship**, 47(2), 2021.P.102305.
33. C.O. Nnadozie, *Library Use as Correlate of User-Satisfaction Amongst Lecturers in University Libraries in South-East Zone of Nigeria*. **Research Journal of Library and Information Science**, 1(2), 2017.31 – 41
34. D., Theiss, *Distance and Online Learners and Library Anxiety: An Exploration into The Causes, Impact, And Recommendations for Practice*. **Journal of Library & Information Services in Distance Learning**, 16(2), 2022. Pp.152-167.
35. G.O., Oyovwe-Tinuoye, *Users Perception of Services, Resources and Facilities in Federal University of Petroleum Resources Effurun (Fupre) Library*. **Library Philosophy and Practice**, 2020. Pp.1-20.

36. L. S., Ledwaba, G. V., Jiyane, & T. Mugwisi, *Examining the Extent of Internet Access in Public Libraries in South Africa*. **Mousaion**, 38(2). 2020.
37. J., Bailey, & K. Faulkner, *Usage and User Experience in An Academic Law Library*. **Legal Information Management**, 18(2), 2018,103-109.
38. N., Soltani-Nejad, H., Vakilimofrad, F., Fazli, M. K., Saberi, A., Doulani, & J. Mazloun, *Developing A Model to Identify the Factors Contributing to User Loyalty of University Libraries*. **The Journal of Academic Librarianship**, 47(5), 2021. 102386.
39. S., Aktar, & U. Habiba, *Evaluating User Information Need and Satisfaction Level at Selected Academic Libraries in Bangladesh*. **Bangladesh Journal of Library and Information Science**, 2021, 185.
40. M. E. Echem, *Information Retrieval Tools and Library Physical Environment as Correlates of Library Utilization by Students in Rivers State University Library, Nigeria*. **Library Philosophy and Practice**, 2018. 1.
41. J., Bailey, & K. Faulkner, *Usage and User Experience in An Academic Law Library*. **Legal Information Management**, 18(2), 2018, 103-109.
42. P. R., Kumar, P. H., Raj, & P. Jelciana, *Exploring Data Security Issues and Solutions in Cloud Computing*. **Procedia Computer Science**, 125, 2018. pp.691-697.
43. M., Herman, M., Herman, M., Iorga, A. M., Salim, R. H., Jackson, M. R., Hurst, & R. Sardinas, *NIIST Cloud Computing Forensic Science Challenges*. US Department of Commerce, National Institute of Standards and Technology. 2020.
44. U. Iyal, *Evaluation Of Librarians Acceptability Levels and Use of Cloud Computing for Library Services in Tertiary Institutions of Kaduna State, Nigeria*. In Theses. 2018,
45. A. V., Iatsyshyn, V. O., Kovach, Y. O., Romanenko, & A. V. Iatsyshyn, *Cloud Services Application Ways for Preparation of Future Phd. in Cite Workshop Proceedings* Vol. 6, 2019, Pp. 197-216.
46. M.,Sharma, R., Gupta, & P. Acharya, *Analysing the Adoption of Cloud Computing Service: A Systematic Literature Review*. **Global Knowledge, Memory and Communication**, 70(1/2), 2020, 114-153.
47. O., Markova, S., Semerikov, A., Striuk, H., Shalatska, P., Nechypurenko, & V. Tron, *Implementation of Cloud Service Models in Training of Future Information Technology Specialists*. Proceedings of the 6th Workshop on Cloud Technologies in Education Cite 2018, Kryvyi Rih, Ukraine, December 21, 2018, 2019.
48. A., Kiv, S., Semerikov, V., Soloviev, & Striuk, A. *Computer Science & Software Engineering*. Ceur Workshop Proceedings 2019. ([Http://Ceur-Ws.Org/](http://Ceur-Ws.Org/)).

49. A. M., Ahmed, & O. W. Allawi, *A Review Study on The Adoption of Cloud Computing for Higher Education in Kurdistan Region-Iraq*. **Uhd Journal of Science and Technology**, 4(1), 2020. 59-70.
50. A., Tella, S. C., Ukwoma, & I. K Adeniyi,. *A Two Models Modification for Determining Cloud Computing Adoption for Web-Based Services in Academic Libraries in Nigeria*. **Journal Of Academic Librarianship**, 46(6), 2020. 102255. <https://doi.org/10.1016/j.acalib.2020.102255>
51. A., Khayer, M. S., Talukder, Y., Bao, & M. N. Hossain, *Cloud Computing Adoption and Its Impact on SMEs' Performance for Cloud Supported Operations: A Dual-Stage Analytical Approach*. **Technology In Society**, 60, 2020. 101225.
52. S. S., Gill, R. C., Arya, G. S., Wander, & R. Buyya, *Fog-Based Smart Healthcare as a Big Data and Cloud Service for Heart Patients Using Iot*. In *International Conference on Intelligent Data Communication Technologies and Internet of Things (ICICI)* Springer International Publishing. 2018 Pp. 1376-1383).
53. P.C., Awa, D.A. Aloysius, & J.N., Okereke, *Platform as a Service (PaaS) And Information Service Delivery in Federal University Libraries in South-South and South-East, Nigeria*. **Lagos Journal of Library and Information Science**, 10(1-2), 2022. Pp.242-254.
54. S. Gul, & S., Bano, *Smart Libraries: An Emerging and Innovative Technological Habitat Of 21st Century*. **The Electronic Library**. 2019.
55. P. Sarkar, *Data as a Service: A Framework for Providing Reusable Enterprise Data Services*. John Wiley & Sons. 2015.
56. T., Alqarni, & A. Barnawi, *A Cloud Adoption Framework : Assessing The Factors And Determinants Of Adoption Cloud Computing Technology*. **Multi-Knowledge Electronic Comprehensive Journal for Education and Science Publications**, 26, 2019. 1-30.
57. S., Sivankalai, *The Impact of Cloud Computing on Academic Libraries*. **Library Philosophy and Practice (E-Journal)**, 9(3), 2021. Pp.1-17.
58. S., Li, F., Jiao, Y., Zhang, & X. Xu, *Problems and Changes in Digital Libraries in the Age of Big Data from The Perspective of User Services*. **The Journal of Academic Librarianship**, 45(1), 2019. 22-30.
59. A. J., Madhuri, *Use and Awareness of Reference Management Software Tools by Research Scholars of Library and Information Science in India: A Study*. **Library Philosophy and Practice (E-Journal)**. 6371. 2021. <https://digitalcommons.unl.edu/libphilprac/6371>

60. S, Abram “35 Powerful Cloud Tools for Modern Librarians - Stephen's Lighthouse,” *Stephen's Lighthouse - Stephen Abram's Posts About Library Land* (Stephen's Lighthouse, October 30, 2018), <https://Stephenslighthouse.Com/2018/11/02/35-Powerful-Cloud-Tools-For-Modern-Librarians-2/>.
61. OCLC. *OCLC Worldshare Management Services*.2012. [Http://Www.Oclc.Org/Worldshare-Management-Services.En.Html](http://www.Oclc.Org/Worldshare-Management-Services.En.Html)
62. S. Sivankalai, "The Impact of Cloud Computing on Academic Libraries." **Library Philosophy and Practice (E-Journal)** 9, No. 3 2021: 1-17.
63. J., Nicholson, & S. Tokoro, *Cloud Hopping: One Library's Experience Migrating from One LSP to Another*. **Technical Services Quarterly**, 38(4), 2021, 377-394.
64. A. J., Aiyebilehin, B., Makinde, R., Odiachi, & C. C. Mbakwe, *Awareness and Use of Cloud Computing Services and Technologies by Librarians in Selected Universities in Edo State*. **International Journal of Knowledge Content Development & Technology**, 10(3), 2020. 7-20.
65. R., Van Dyk, & J. P. Van Belle, *Factors influencing the intended adoption of digital transformation: a South African case study*. In *2019 Federated Conference on Computer Science and Information Systems (FedCSIS) IEEE*. 2019, pp. 519-528.
66. H. S., Pathak, P., Brown, & T. Best, *A Systematic Literature Review of the Factors Affecting the Precision Agriculture Adoption Process*. **Precision Agriculture**, 20, 2019, 1292-1316.
67. A., Khayer, M. S., Talukder, Y., Bao, & M. N. Hossain, *Cloud Computing Adoption and Its Impact on SMES' Performance for Cloud Supported Operations: A Dual-Stage Analytical Approach*. **Technology in Society**, 60, 2020. 01225.
68. A., Owusu, *Determinants of Cloud Business Intelligence Adoption among Ghanaian SMEs*. **International Journal of Cloud Applications and Computing (IJCAC)**, 10(4), 2020. Pp.48-69.
69. J., Guchacha, *Integration of Cloud Computing and Service Delivery in Academic Libraries with Reference to South Eastern Kenya University*, Doctoral Dissertation, University of Nairobi. 2019.
70. M., Yuvaraj, *Problems and Prospects of Implementing Cloud Computing in University Libraries: A Case Study of Banaras Hindu University Library System*. **Library Review**. 2015.
71. K. Martzoukou, & J. Elliott, *The Development of Digital Literacy and Inclusion Skills of Public Librarians*. **Communications in Information Literacy**, 10(1), 5. 2016.

72. J., Mattar, D. K., Ramos, & M. R. Lucas, *Digcomp-Based Digital Competence Assessment Tools: Literature Review and Instrument Analysis*. **Education And Information Technologies**, 27(8), 2022. 10843-10867.
73. A. M., Cox, S., Pinfield, & S. Rutter, *The Intelligent Library: Thought Leaders' Views on The Likely Impact Of Artificial Intelligence On Academic Libraries*. **Library Hi Tech**, 37(3), 2019. 418-435.
74. A., Mishra, Y.I., Alzoubi, A.Q. Gill, & M.J.,Anwar, *Cybersecurity Enterprises Policies: A Comparative Study*. **Sensors**, 22(2), 2022. P.538.
75. M. C., Martínez-Bravo, C., Sádaba Chalezquer, & J. Serrano-Puche, *Dimensions of Digital Literacy In The 21st Century Competency Frameworks*. **Sustainability**, 14(3), (2022). 1867.
76. A. P.,Joel, & F. L.Ibrahim, *Digital Competencies Needed By Library Personnel And Information Professionals For Knowledge Management Of 21stcentury University Libraries In Borno State*, **Library Philosophy And Practice** 2021.
77. S., Ahmed, & T. Rasheed, *Relationship Between Personality Traits and Digital Literacy Skills: A Study of University Librarians*. **Digital Library Perspectives**, 36(2), (2020). 191-206.
78. O. A., Ayoku, & V. N. Okafor, *ICT Skills Acquisition and Competencies of Librarians: Implications for Digital and Electronic Environment in Nigerian Universities Libraries*. **The Electronic Library**, 33(3), 2015.502-523.
79. G. O., Oyovwe-Tinuoye, S. U., Omeluzor, & I. O. Patrick, *Influence of ICT Skills On Job Performance of Librarians in University Libraries of South-South, Nigeria*. **Information Development**, 37(3), 2021.345-358.
80. O., Jamogha, E., Jamogha, & L. S. Godwin *Influence of ICT Skills On Library Information Resources Utilization by Undergraduates in Two Universities in South-West, Nigeria*. **Information Impact: Journal Of Information and Knowledge Management**, 10(2), 2019. 67-80.
81. S., Ahmed, & A. Sheikh, *Information and Communication Technology Skills Among Library and Information Science Professionals: A Predictor of Enhanced Library Services*. **Journal of Librarianship and Information Science**, 53(3), 2021. 444-453.
82. K., Ahmad, Z. JianMing, & M. Rafi, *An Analysis of Academic Librarians Competencies and Skills for Implementation of Big Data Analytics in Libraries: A Correlational Study*. **Data Technologies and Applications**, 53(2), (2019). 201-216.
83. C. C., Okeji, E. C., Tralagba, & I. C. Obi, *An Investigation of the Digital Literacy Skills and Knowledge-Based Competencies Among Librarians Working in University*

- Libraries in Nigeria. Global Knowledge, Memory and Communication*, 69(4/5), (2020). 311-330.
84. A. D., Atanda, K. A., Owolabi, & C. P. Ugbala, *Professional Competence and Attitudes of Library Personnel Towards Digital Services in Selected University Libraries in Nigeria. Digital Library Perspectives*, 37(3), (2021). 209-222.
85. R. K. F., Ip, & C. Wagner, *Libqual+® As A Predictor of Library Success: Extracting New Meaning Through Structured Equation Modeling. The Journal of Academic Librarianship*, 46(2), (2020). 102102.
86. Arl Statistics *What is ARL Statistics?* (2022). Available At: <https://www.arlstatistics.org/home>. Accessed On November 13, 2022
87. I., Jauhainen, & K. Hintikka, *An International Comparison of Libqual+ Results Based on The Information Literacy and Liber Questions. Qualitative And Quantitative Methods on Libraries*, 7(3), 2018. 545-553.
88. M. Ashiq, *Measuring Library Service Quality of The College Libraries in Pakistan: An Analysis of The Libqual Comments. Library Philosophy and Practice*, 2020, 1-24.
89. P.N., Kiriri, *Reliability and Validity of a Libqual Scale: A Case of a Private University in Kenya. DbA Africa Management Review*, 9(1). 2019.
90. L. K., Fai, L. W., Siew, & L. W. Hoe, *Analysis on the Library Service Quality with Analytic Hierarchy Process Model. In Journal of Physics: Conference Series. Iop Publishing*. Vol. 1706, No. 1, 2020, P. 012154
91. R., Vuorikari, Y., Punie, S., Carretero Gomez, G. Van Den Brande, *Digcomp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: The Conceptual Reference Model*. Luxembourg Publication. Office of the European Union. Eur 27948 2016. En. Doi:10.2791/11517
92. L., Pangrazio, A.L. Godhe, & A.G.L., Ledesma, *What Is Digital Literacy? A Comparative Review of Publications Across Three Language Contexts. E-Learning and Digital Media*, 17(6), 2020. Pp.442-459.
93. M. N. Rahman, *"Exploring the Factors Influencing Big Data Technology Acceptance"*. Dissertations Portland State University Paper, 2020, 5515. <https://doi.org/10.15760/Etd.7389>.
94. H.K. Kao, S.N. Tsai, W.L. Chang, & J. H. Chang, *Factors Affecting Vlog Viewers' Behavioral Intentions: An Empirical Study Based on Innovation Diffusion Theory*. In 2021 International Conference on Technologies and Applications of Artificial Intelligence (TAAI) 2021, Pp. 168-173.

95. *Diffusion of Innovations Theory Definition.*" Investopedia. Accessed April 2, 2022. <https://www.investopedia.com/terms/d/diffusion-of-innovations-theory.asp>
96. M. Sultan, & M. Rafiq, *Open Access Information Resources and University Libraries: Analysis of Perceived Awareness, Challenges, And Opportunities.* **The Journal of Academic Librarianship**, 47(4), 2021. P.102367.
97. Q. Zhouli, Z., Huang, X. & D.K., Chiu, *Undergraduates' Electronic Resources Diffusion At The Peking University: An Exploration On Language Impacts.* **Library Collections, Acquisitions, & Technical Services**, 40(1-2), 2017. Pp.1-9.
98. L. Cirus, & Simonova, I. *Pupils' Digital Literacy Reflected in Teachers' Attitudes Towards Ict: Case Study of The Czech Republic.* **Computer Science**, 2(3), 2021. 1-11.
99. E. Kiprop, Matsui, K. & Maundu, N., *The Role of Household Consumers in Adopting Renewable Energy Technologies in Kenya.* **Environments**, 6(8), 2019. P.95.
100. P. Grover, A.K. Kar, M. Janssen, & P.V. Ilavarasan, *Perceived Usefulness, Ease of Use and User Acceptance of Blockchain Technology for Digital Transactions—Insights from User-Generated Content on Twitter.* **Enterprise Information Systems**, 13(6), 2019. Pp.771-800.
101. B.A. Kumar, & P. Mohite, *Usability of Mobile Learning Applications: A Systematic Literature Review.* **Journal Of Computers in Education**, 5(1), 2018. Pp.1-17.
102. L. Wu, & Chiu, M.L., *Organizational Applications Of It Innovation And Firm's Competitive Performance: A Resource-Based View And The Innovation Diffusion Approach.* **Journal Of Engineering and Technology Management**, 35, 2015. Pp.25-44.
103. M. Putteeraj, N. Bhungee, J. Somanah, & N. Moty, *Assessing E-Health Adoption Readiness Using Diffusion of Innovation Theory and The Role Mediated by Each Adopter's Category in A Mauritian Context.* **International Health**, 2021.
104. M. U. Hassan, A. Iqbal, & Z. Iqbal, *Factors Affecting the Adoption of Internet Banking in Pakistan: An Integration of Technology Acceptance Model and Theory Of Planned Behaviour.* **International Journal of Business Information Systems**, 28(3), 2018. Pp.342-370.
105. N., Gandotra, N., Tyagi, & S. Tiwari, *Application of Cloud Computing Technology in Libraries.* **Journal of Advancements in Library Sciences**, 6(2), (2019). 16-23.
106. Q. Kang, *Library directors' concerns and attitudes towards going green and sustainability in China: An unexplored area.* **Journal of Librarianship and Information Science**, 52(2), 2020. 382-398.

107. A., Yakubu, F., Ibrahim, A. Yahaya, *Data Security Factors Influencing the Adoption of Cloud Computing Services by Two Selected Nigerian Academic Libraries*. **Inter. J. Acad. Lib. Info. Sci.** 9(1): 2021. 31-40
108. A. I., Kayode, A., Tella, & S. O. Akande, *Ease-Of-Use and User-Friendliness of Cloud Computing Adoption or Web-Based Services in Academic Libraries in Kwara State, Nigeria*. **Internet Reference Services Quarterly**, 23(3-4), 2020. 89-117.
109. U. Idhalama, & A. Fidelis, "Perception and Attitude of Librarians Towards Cloud Computing in The University of Dar Es Salaam Library" **Library Philosophy and Practice (E-Journal)**. 4023. 2020. <https://Digitalcommons.Unl.Edu/Libphilprac/4023>
110. A. N. Zubairu, Akinola, J. O. Olugbenga & S. A. Hamzat, *Awareness An Adoption of Cloud Computing In Nigerian Libraries: An Aid To Library Services"* **Library Philosophy And Practice (E-Journal)**. 4973. 2021. <https://Digitalcommons.Unl.Edu/Libphilprac/4973>
111. J. Roberts, *Future and Changing Roles of Staff in Distance Education: A Study to Identify Training and Professional Development Needs*. **Distance Education**. 39: 2018. 37-53..
112. D., Oguiche D. A. Lamidi, & P. Gabasa, *Capacity Building for Library and Information Professionals: Core Skills and Competence*. **International Journal of Applied Technologies in Library and Information Management** 3.2: 2017. 1-5.
113. S. Robertson, *Exploring the Efficacy of Training and Development for Liaison Librarians at Deakin University, Australia*. **Journal of Higher Education Policy and Management**. 40.2: 2018. 107-120.
114. L. Ashcroft, & C. Watts, *ICT Skills For Information Professionals in Developing Countries: Perspective from A Study of The Electronic Information Environment in Nigeria*. **International Federation of Library Associations and Institutions Journal** 3.1(1): 2005. 6 – 12.)
115. J., Idiegbeyan-Ose, C., Nkiko, M. Idahosa, & N. Nwokeoma, *Digital Divide: Issues and Strategies for Intervention in Nigerian Libraries*. **Journal of Cases on Information Technology** 18: 2016. 29-39.
116. C. V. Anunobi, *Human Capacity Building in Nigerian University Libraries: An Imperative for Academic Libraries' Contribution Towards National Development*. **African Journal of Library, Archives and Information Science** 23.1: 2013. 33-44.
117. A. Tella, & A. O. Sidiq, *Loan and Cooperation Among Selected Academic Libraries in Kwara State, Nigeria: An Empirical Analysis*. **Journal of Interlibrary Loan, Document Delivery & Electronic Reserves**. 26.2: 2017. 103-120.

118. S. Abban, *Training and Development of Library Staff: A Case of Two University Libraries in Ghana*. **Library Philosophy and Practice**. 2018. Retrieved from <https://Digitalcommons.Unl.Edu/Libphilprac/1794>.
119. M. Ahenkorah-Marfo, & H. Akussah, *Information on the Go: Perspective of Academic Librarians on Use of Social Media In Reference Services*. **International Information and Library Review** 49.2: 2017. 87-96.,
120. O. Omorodion, *Library as A Change Agent: Examining the Roles of Library in Private Higher Institutions in South West Nigeria*. **Library Philosophy and Practice**. 2018. Retrieved from <https://Digitalcommons.Unl.Edu/Libphilprac/2006>.
121. G. O., Oyovwe-Tinuoye, S. U., Omeluzor, & I. O. Patrick, *Influence of ICT Skills On Job Performance of Librarians in University Libraries of South-South, Nigeria*. **Information Development**, 37(3), 2021. 345-358.
122. L. Appleton, *Training and Development for Librarians. Why Bother?* Retrieved From [www.Elsevier.Com](http://www.Elsevier.Com)>Library-Connect. 2018.
123. A. Abubakar, & I. S. Attahir, *Innovative and Creative Skills for the 21st Century Librarian: Benefits and Challenges in Nigerian Academic Libraries*. **Journal of Information and Knowledge Management** 9.2: 2018. 113 – 120.
124. L. Federer, *Defining Data Librarianship: A Survey of Competencies, Skills and Training*. **Journal of Medical Library Association** 106.3: 2018. 294-303.
125. J. Hoover, *Gaps in It and Library Services at Small Academic Libraries in Canada*. **Information Technology and Libraries**. 2018. Pp 15-26 Retrieved from <https://doi.org/10.6017/ital.v37i4.10596>.)
126. J., Idiegbeyan-Ose, C. Nkiko, & O. Ifeakachuku, *Value Added Service to Academic Library Users In 21st Century: Using Competitive Intelligence Approach*. **Library Philosophy and Practice**. 2017. Retrieved from <http://Digitalcommons.Unl.Edu/Libphilprac/1570>.
127. S. U., Omeluzor, G. D., Pelemo, M. O., Agbawe, A. O. Onasote, & A. Imam, *Library Infrastructure as Predictor of Turnover Intentions of Librarians in University Libraries in Nigeria*. **Journal of Information and Knowledge Management** 8.1: 2017. 1-12.
128. N., James, L. Shamchuk, & K. Koch, *Changing Roles of Librarians and Library Technicians*. **The Canadian Journal of Library and Information Practice and Research** 10.2: 2015. 1-29.
129. H. U. Igbo, & N. T. Imo, *Electronic Information Resource Sharing Among University Libraries in Southern Nigeria: Opportunities and Challenges*. **African Journal of Library Archival and Information Science** 27.1: 2017.77-91.

130. I. Ajie, *Information Service Provision by Librarians in The Era of Globalisation*. **Library Philosophy and Practice**. 2019. Retrieved April 3, 2020, From <https://Digitalcommons.Unl.Edu/Libphilprac/2517>.
131. A. Aliyu, & S. Shuaib, *Assessment of Staff Training and Development Programmes in Isa Kaita Library, Kaduna Polytechnic, Kaduna, Nigeria*. **Ebonyi Journal of Library and Information Science** 2.1: 2016. 203-210.
132. T. Abba, & B. U. Babayi, *Website Use and Evaluation by Senior Library Staff in Ibrahim Babangida Library, Modibbo Adama University of Technology, Yola, Nigeria*. **Information Technologist** 16.1: 2019. 95-105.
133. E. C., Umeji, E. F. Ejedafiru, & L. Oghenetega, *Information /ICT Literacy Levels and Skills among Library Personnel in Madonna University Library, Okija*. **IOSR Journal of Humanities and Social Science** 15.3: 2013. 70-75.
134. C., Mishra, A. K., Manglam, & P. Moita, *Pivotal Role of the Library in Higher Education Reforms: A Critical Look*. In *Handbook of Research on Knowledge and Organization Systems in Library and Information Science*. **IGI Global**. 2021. pp. 251-269
135. B. O., Akintola, B., Adetomiwa, & F. N. Onifade, *Staff Training and Career Development among Library Staff in Federal Universities in Southwest, Nigeria*. **International Information & Library Review**, 54(4), 2022. 315-324.
136. N. Aderibigbe, & C. M. Chiemenem, *Cultural Attitudes of Library Personnel and Their Readiness for the Global Library Work Environment*. **Library Philosophy and Practice**. 2019. Retrieved, From <https://Digitalcommons.Unl.Edu/Libphilprac/2776>.
137. I. Ajie, *Professional Branding of an Information Professional through ICT For Effective Service Delivery*. **Library Philosophy and Practice**. 2019. Retrieved from <https://Digitalcommons.Unl.Edu/Libphilprac/2515>.
138. O. A. Ayoku, & V. M. Okafor, *ICT Skills Acquisition and Competencies of Librarians: Implications for Digital and Electronic Environment in Nigerian Universities Libraries*. **The Electronic Library** 33.3: 2015. 502 – 523.
139. T. T., Oyedokun, F. A., Oyewumi, M., Akanbi, P. Lawal, & D. M. Laaro, *Assessment of Ict Competencies of Library Staff in Selected Universities in Kwara State, Nigeria*. **Library Philosophy and Practice**. 2018. Retrieved from <https://Digitalcommons.Unl.Edu/Libphilprac/1797>.
140. O. J. Sani, & A. Musa, *Influence of ICT Competencies on Job Performance Among Library Personnel in Tertiary Institution in Lokoja, Kogi State, Nigeria*. **Samaru Journal of Information Studies** 19.1: 2019. 62-76.

141. M. O., Saib, M., Rajkoomar, N., Naicker, & C. T. Olugbara, *Digital pedagogies for librarians in higher education: a systematic review of the literature*. **Information Discovery and Delivery**, 2022.
142. I. M., Dabengwa, J., Raju, & T. Matingwina, *Academic librarian's transition to blended librarianship: a phenomenology of selected academic librarians in Zimbabwe*. **The Journal of Academic Librarianship**, 45(4), 2019. 343-357.
143. R. J., Arokyamary, C. P. Ramasesh, & D. Swamy, *ICT Skills and Core Competences of Lis Professionals: A Study*. **Library and Information Services for All**. 338. 2017. Retrieved From E Prints. Uni:-Mysore.Ac.In/18296/1/19pdf.
144. C. C., Okolocha, & N. N. Ezike, *Extent of information and communication technology skills possessed by office technology and management graduate workers in the civil service of Enugu State*. **NAU Journal of Technology and Vocational Education**, 3(1), 2019.11-23.
145. M. U., Farooq, A., Ullah, M. Iqbal, & A. Hussain, *Current and Required Competencies of University Librarians in Pakistan*. **Library Management** 37. 8&9: 2016. 410-425.
146. H. Shidi, & R. Ape, *Information and Communication Technology Facilities and Skills Level of Library Staff of Universities in Benue State*. **Information Technologist** 8:2: 2011. 85-92.
147. B., Kwaghga, , I. A., Anthony, & T. A. F. Helen, *Information retrieval skills and the use of electronic resources in university libraries by undergraduate Students in Benue State University*. **Library Philosophy and Practice (e-journal)**. 2019.
148. R., Ezeibe, T. N., Udo-Okon, & E. Okwuwe, *Skill Needs of Library Personnel for Effective Cataloguing and Classification Services in University Libraries in Akwa Ibom State, Nigeria*. **International Journal of Library and Information Science Studies**, 7(3), 2021. 55-64.
149. A. I., Ntui, & U. Enang, *Socio-Demographic Variables and Utilization of ICT Among Members of Staff of University Libraries in Cross-River and Akwa-Ibom State Nigeria*. **Global Journal of Educational Research**, 21(2), 2022. 159-171.
150. G. O., Oyovwe-Tinuoye, S. U., Omeluzor, & I. O. Patrick, *Influence of ICT skills on job performance of librarians in university libraries of South-South, Nigeria*. **Information Development**, 37(3), 2021. 345-358.
151. S., Bano, M. Mehraj, & I. Rehman, *Librarians and Their Distinctive Personality Traits in the 21st Century Digital Era*. **Library Philosophy and Practice**. 2019. Retrieved from <https://Digitalcommons.Unl.Edu/Libphilprac/2604>.

152. I., Ullah, S., Khusro, & A. Ullah, *Library Management Practices in the Libraries of Pakistan*. **Information Technology and Libraries**, 41(3). 2022.
153. I. U. Haq, *Patterns of Library and Information Science Research in Pakistan during 2020*. **Library Philosophy and Practice (e-journal)**, 6529, 2021. 1-28.
154. P.K., Mahanta, *Usage of Information and Communication Technology in The Degree College Libraries of Assam: A Study*. **Library Philosophy and Practice (Ejournal)**, 3829, 2020. Pp.1-13.
155. J. O., Ukwetang, C. O., Nja, E., Eneyo, B. A., Ambe, & A. B. Etta, *Usage of information communication technology (ICT) and academic performance of students in tourism in selected secondary schools in Calabar Municipality in Cross River State, Nigeria*. **European Journal of Social Sciences**, 62(3), 2021. 79-88.
156. N. K. Bhoi, *Use of Information Communication Technology (Ict) And Library Operation: An Overview*. Proceedings Of an International Conference on Future Libraries: From Promises to Practices 2017. Retrieved From [Lite//Www.Researchgate.Net](http://Lite//Www.Researchgate.Net).
157. S. Swaminathan, & G. Karthikeyan, *A Study on Level of Awareness of Computer and Collaborative Tools Among Lis Professionals*. **Current Trends in Library and Information Science**. 1 & 2 2016.. Retrieved From [Www.Jctl.Org/Index.Php/Jctl/Article/View/1/](http://Www.Jctl.Org/Index.Php/Jctl/Article/View/1/).
158. B.O., Akintola, *Capacity Building, ICT Skills, Use and Service Delivery of Library Personnel in Universities in Southwestern Nigeria (Doctoral Dissertation)*. 2021.
159. A. S. Obotu, O. O. Chukwuka, & S. B. Gambo, *The Need for The Use of Information and Communication Technology in Two University Libraries in Nigeria*. **Library Philosophy And Practice** 2019.. Retrieved From [Ttps://Digitalcommons.Unl.Edu/Libphilprac/2665](https://Digitalcommons.Unl.Edu/Libphilprac/2665).
160. E. F., Efosa, R. M Sheji, & O. S. Efosa-Isibor, *Information and Communication technologies For Service Delivery In Babs Fafunwa Library, Adeyemi College Of Education, Ondo, Nigeria*. **Ebony Journal of Library and Information Science** 2.1: 2015. 101-108.
161. F. Antidius, *Usage of Information and Communication Technology to Support Innovative Library Services in Universities: A Case of The University of Dar Es Salaam Wilbert Chagula Library*. **University Of Dar Es Salaam Library Journal** 13.2: 2018. 3-17.
162. Z. M. Abdullahi, & I. Haruna, *Utilisation Of Information and Communication Technology (Ict) For Information Service Delivery in University Libraries in Adamawa State*. **The Information Scientist** 5.2: 2008. 24-30.

163. Y.T. Babalola, & Y. Haliso, *Library and Information Services to The Visually Impaired: The Role of Academic Libraries*. **Canadian Social Science** 7.1: 2011. 140-147.
164. O. E., Ani, E. U. Atseye, & J. E. Esin, *Issues and Challenges of Globalisation of Library Services in Nigeria in the 21st Century*. **Information Development** 21.3: 2005. 193-201.
165. E. C., Madu, A. N., Idoko, M. B. Dirisu, & N. Emerole, *Institutional Readiness and Application of Web 2.0 For Information Service Provision in University Libraries in Nigeria*. **Information And Knowledge Management** 7.8: 2017. 19-25.
166. A. A. Adeleke, & R. Olorunsola, *ICT And Library Operations: More on The Online Cataloguing and Classification Tools and Techniques in Nigerian Libraries*. **The Electronic Library** 28.3: 2010. 453 – 462.
167. A. I., Ntui, B. E. Robert, & E. I. Usang, *Economic Challenges and Prospects Associated with The Utilisation of Information and Communication Technology (Ict) For Library Services in Universities In Cross River State, Nigeria*. **Computing And Information Systems**. 21.1: 2017.29-39.

## **Chapter Three**

### **Methodology**

This chapter presents the procedure to be followed in conducting the research. The chapter explained all aspect of the research methodology such as research design, population of the study, sample size and sampling technique, description of research instrument, validity and reliability of the instrument, data collection procedure and method of data analysis

#### **3.1 Research design**

The study adopted descriptive survey research design and a mixed method approach. This means that it incorporated both the quantitative and qualitative aspects of descriptive research. This approach is considered necessary in order to ensure the triangulation of data obtained from the different instruments. The researcher aims to take advantage of the opportunities provided by qualitative studies to gain in-depth insights into the phenomenon under study and enrich the quantitative data collected through the survey.

#### **3.2 Population of the study**

The population of the study consist of 243 library personnel (237 library personnel & 6 university librarians) from federal universities in southwest of Nigeria. This figure is obtained through site visits and liaison with library managers in the selected institutions. The breakdown of the figure is provided in Table 3.1.

**Table 3.1: Population Distribution of the Respondents**

S/N	Universities	Library personnel	University Librarians
	University of Ibadan, Ibadan	68	1
	Federal University, Oye-Ekiti, Ekiti State	35	1
	Federal University of Agriculture, Abeokuta	44	1
	Federal University of Technology, Akure, Ondo State	28	1
	Obafemi, Awolowo University, Ile-Ife, Osun State	34	1
	University of Lagos, Akoka, Lagos State	28	1
	<b>Total</b>	<b>237</b>	<b>6</b>

Source: Librarians' office of the institutions.

### **3.3 Sample Size and Sampling Technique**

The study sample is made up of 243 library personnel selected from federal universities across the southwest geopolitical zone of Nigeria and total enumeration was used.

### **3.4 Description of Research Instrument**

The main instrument for the study was a structured questionnaire adapted from various studies related to the current subject of interest which were supplemented by the use of an open interview schedule. In line with the research objective, the questionnaire was developed to cover four distinct sections (A – D).

Section A deals with the demographic information of the respondents which is self-developed. It contains items such as Age, gender, department, Institution, etc.

Section B focused on the quality of library services in the selected libraries. The section contains items adapted from the LibQual Scale<sup>1</sup>. It has three subheadings namely library as place, affect of service and information control. Each of the items in this section is measured by 4-point Likert scale such as 1= Strongly Disagree; 2=Disagree, 3=Agree and, 4= Strongly Agree. Examples of statements in this section include “Majority of library

personnel in my library understand users' information needs", My library has attractive and aesthetic features" among others.

Section C focused on the characteristics of cloud computing. The Section contains various statements adapted from the innovation diffusion theory and the technological, environmental, and organizational framework<sup>2</sup>. Each of the items in this section is measured by a 4-point Likert scale such as 1= Strongly Disagree; 2=Disagree, 3=Agree and, 4= Strongly Agree. Examples of statements in this section include "Adoption of cloud computing will provide a more protective environment than using library servers", I have previous positive experience with the use of cloud computing" among others.

Section D focused on digital literacy competency of library personnel. The questions and statements in the section are adapted from the DigComp 2.0 framework developed by the European Union to measure digital competencies<sup>3</sup>. The section is subdivided into information and data literacy, communication and collaboration, and digital content creation. Each of the items in this section is measured by 4-point Likert scale such as 4= Very high extent, (VHE) 3= High Extent, (HE) 2= Low Extent (LE)and 1= Very Low Extent (VLE). Example of statements in this section include "I am able to articulate my information needs while using the internet," I have the skills to create and edit digital content in different formats" among others

### **3.5 Validity of Research Instrument**

Validity refers to the ability of a research instrument to measure the constructs it is designed to measure. The research instrument for this study was examined for content and face validity. This was done by the supervisor and other experts in the field of

Library and Information Science. The corrections made after this were incorporated to ensure the validity of the instrument.

### **3.6 Reliability of Research Instrument**

Reliability focused on the ability of a research instrument to measure accurately what it is expected to measure when administered to similar populations. The questionnaire to be used in this study was also tested for reliability before the fieldwork. The reliability of the instrument was tested through a pilot study using thirty (30) library personnel from university of Nigeria, Nsukka, Enugu state, Eastern region of Nigeria which is not part of the study. The responses were analyzed to determine the Cronbach alpha of each of level of Service quality. The Cronbach Alpha value is 0.85, 0.75 and 0.82 respectively.

### **3.7 Method of Data Collection**

The research instrument was administered physically to the respondents by the researchers and trained research assistants who were briefed on the objective of the study and the procedure to follow in data collection. The researcher plans to administer the questionnaire in person to the respondents. A letter of introduction was obtained from the Department of Information Management, Lead City University which was presented to the management of each library selected. The whole process of questionnaire administration lasted for five weeks.

### **3.8 Method of Data Analysis**

The data collected in the process of this study were analyzed using the appropriate method of analysis. The demographic and quantitative data collected through the main research instrument which is the questionnaire were analyzed using descriptive statistics such as simple percentages, mean and standard deviation while thematic was used for the qualitative data. In addition, the study hypotheses were tested at 0.05 level of significance using Regression analysis. The IBM SPSS software version 24 was used to analyze the data.

Lead City University Ibadan DO NOT COPY

## Endnotes

1. P., Khaola, & M. Mabilikoane, *Perception of library service quality, satisfaction and frequency of use of library resources*. **Inkanyiso: Journal of Humanities and Social Sciences**, 7(1), 2015, 44-52.
2. M. T., Amron, R., Ibrahim, N., Azaliah, A., Bakar, & S. Chuprat, *Determining Factors Influencing the Acceptance of Cloud Computing Implementation Determining Factors Influencing Acceptance of a Cloud Computing Implementation*. **Procedia Computer Science**, 161, 2019, 1055–1063. <https://doi.org/10.1016/j.procs.2019.11.216>
3. R., Vuorikari, Y., Punie, S. C., Gomez, & G. Van Den Brande, *DigComp 2.0: The digital competence framework for citizens. Update phase 1: The conceptual reference model* (No. JRC101254). **Joint Research Centre (Seville site)**. 2016

## Chapter Four

### Results and Discussion of Findings

The presentation of data, analysis, and interpretation of the results were covered in this chapter. The research questions and hypothesis formulated for this study guided the presentation in this chapter. The first section, which is descriptive, shows the presentation of the analyses of demographic data using tables with frequencies and percentages. The second section shows the presentation of the analyses of research questions using tables with frequencies, percentages and mean distribution of the responses. This section also includes the presentation of the interview report. The interview was conducted for six (6) University Librarians. The third section presents the test of hypotheses using regression analysis and the final section covers the discussion of findings.

A total of two hundred and thirty-seven (237) copies of questionnaire were administered, and two hundred and seven (207) copies were returned. Out of the total copies of questionnaires returned, two hundred and two (202) copies were certified as dully filled and considered usable. The usable questionnaire accounts for 85.2% response rate. The response results are presented in Table 4.1.

**Table 4.1: Response Rate**

<b>Response</b>	<b>Frequency</b>	<b>Percent (%)</b>
Returned and used	202	85.2
Not returned	30	12.7
Returned but not usable	5	2.1
Total of questionnaires distributed	<b>237</b>	<b>100</b>

**Source: Field Survey, 2023**

#### 4.1 Demographic Data of Respondents

This section presents the results of the demographic profiles of the respondents. Table 4.2 reveals the gender, age, educational level and years of experience of the respondents.

Variables	Measurement	Frequency	Percentage
<b>Institution</b>	FUNAAB	35	17.3%
	FUOYE	34	16.8%
	FUTA	51	25.2%
	OAU	36	17.8%
	UI	24	11.9%
	UNILAG	22	10.9%
	<b>Total</b>	<b>202</b>	<b>100.0%</b>
<b>Gender</b>	No response	5	2.5%
	Male	104	51.5%
	Female	93	46.0%
	<b>Total</b>	<b>202</b>	<b>100.0%</b>
<b>Age</b>	No response	2	1.0%
	< 25 years	9	4.5%
	25 – 29 years	8	4.0%
	30 – 34 years	28	13.9%
	35 – 39 years	44	21.8%
	40 – 44 years	44	21.8%
	45 – 49 years	35	17.3%
	50 years and above	32	15.8%
	<b>Total</b>	<b>202</b>	<b>100.0%</b>
<b>Rank/Cadre</b>	No response	3	1.5%
	Library Officer	47	23.3%
	Assistant Librarian	36	17.8%
	Librarian II	33	16.3%
	Librarian I	25	12.4%
	Senior Librarian	24	11.9%
	Principal Librarian	34	16.8%
	<b>Total</b>	<b>202</b>	<b>100.0%</b>
<b>Library Section</b>	No response	11	5.4%
	Technical	56	27.7%
	Readers Services	59	29.2%
	Serials Management	33	16.3%
	E-Library	43	21.3%
	<b>Total</b>	<b>202</b>	<b>100.0%</b>

**Table 4.2: Demographic Profiles of Respondents**

Source: Field Survey, 2023

According to Table 4.2, 35 respondents representing 17.3% were from Federal University of Agriculture, Abeokuta (FUNAAB); 34 respondents representing 16.8% were from (Federal University, Oye-Ekiti) FUYOYE; 51 respondents representing 25.2% were from Federal University of Technology, Akure (FUTA); 36 respondents representing 17.8% were from Obafemi Awolowo University (OAU); 24 respondents representing 11.9% were from University of Ibadan (UI); and 22 respondents representing 10.9% were from University of Lagos (UNILAG). The demographic profiles of respondents by gender show that 104 respondents representing 51.5% were male while 93 respondents representing 46.0% were female, indicating that most of the respondents were male. The gender profile also reveals that 5 respondents representing 2.5% did not disclose their gender. The demographic characteristics of respondents as shown by age in Table 4.2 shows that 44 respondents representing 21.8% were between 35 and 39 years; 44 respondents representing 21.8% were between 40 and 44 years; 35 respondents representing 17.3% were between 45 and 49 years; 32 respondents representing 15.8% were 50 years and above; 28 respondents representing 13.9% were between 30 and 34 years; 9 respondents representing 4.5% were less than 25 years; and 8 respondents representing 4.0% were between 25 and 29 years. The age profile also shows that 2 respondents representing 1.0% did not disclose their age. Therefore, the age profile indicates that a lot of the respondents were between 35 and 44 years.

The demographic profiles by rank or cadre reveals that 47 respondents representing 23.3% were Library Officers; 36 respondents representing 17.8% were Assistant Librarians; 34 respondents representing 16.8% were Principal Librarians; 33 respondents representing 16.3% were Librarian II; 25 respondents representing 12.4% were Librarian

I; and 24 respondents representing 11.9% were Senior Librarians. The profile also shows that 3 respondents representing 1.5% were not interested in disclosing their rank or cadre. The rank or cadre profile suggests that a lot of the respondents were Library Officers. The profile by library section shows that 59 respondents representing 29.2% worked in readers' services section; 56 respondents representing 27.7% worked in the technical section; 43 respondents representing 21.3% worked in the e-library section; and 33 respondents representing 16.3% worked in the serials management section. The profile also shows that 11 respondents representing 5.4% did not disclose their library section. Hence, the profile by library section reveals that most of the respondents worked in the readers' services section and the technical section.

#### 4.2 Analysis of Research Questions

**Research Question One:** What is the level of service quality provided by library personnel in academic libraries in federal universities in Southwest, Nigeria?

**Table 4.3: Analysis Of Responses on Level of Service Quality Provided by Library Personnel in Academic Libraries in Federal Universities in Southwest, Nigeria**

Affect of service	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean
Majority of library personnel in my library understand users' information need	106 (52.5%)	88 (43.6%)	8 (4.0%)	0 (0.0%)	3.49
Majority of library personnel in my library are willing to help users	79 (39.1%)	118 (58.4%)	5 (2.5%)	0 (0.0%)	3.37
Majority of library personnel in my library give users individual attention	78 (38.6%)	115 (56.9%)	9 (4.5%)	0 (0.0%)	3.34
Majority of library personnel in my library instill confidence in users	63 (31.2%)	127 (62.9%)	11 (5.4%)	1 (0.5%)	3.25
Majority of library personnel in my library have enough knowledge to answer user questions	73 (36.1%)	115 (56.9%)	13 (6.4%)	1 (0.5%)	3.29
<b>Weighted Mean</b>					<b>3.35</b>
<b>Library as place</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Mean</b>

My library is conducive for study and learning	93 (46.0%)	106 (52.5%)	3 (1.5%)	0 (0.0%)	3.45
My library has separate spaces for individual and group activities	80 (39.6%)	107 (53.0%)	11 (5.4%)	4 (2.0%)	3.30
My library building is located in a welcoming and comfortable environment	90 (44.6%)	107 (53.0%)	4 (2.0%)	1 (0.5%)	3.42
My library has attractive and aesthetic features	81 (40.1%)	109 (54.0%)	9 (4.5%)	3 (1.5%)	3.33
My library has comfortable furniture and equipment	82 (40.6%)	115 (56.9%)	4 (2.0%)	1 (0.5%)	3.38
<b>Weighted Mean</b>					<b>3.38</b>
<b>Information control</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Mean</b>
My library provides unrestricted access to electronic information resources	80 (39.6%)	108 (53.5%)	11 (5.4%)	3 (1.5%)	3.31
My library has modern equipment that allow users to easily access needed information	81 (40.1%)	109 (54.0%)	11 (5.4%)	1 (0.5%)	3.34
My library has access tools that allow users to find materials on their own	82 (40.6%)	115 (56.9%)	4 (2.0%)	1 (0.5%)	3.38
My library has website/information system that enhance quick access to needed information	86 (42.6%)	109 (54.0%)	4 (2.0%)	3 (1.5%)	3.38
My library makes information resources easily accessible for individual use	83 (41.1%)	112 (55.4%)	7 (3.5%)	0 (0.0%)	3.38
<b>Weighted Mean</b>					<b>3.36</b>
<b>Overall Weighted Mean</b>					<b>3.36</b>

**Decision rule:** < 2.5 = low; 2.5 = moderate; > 2.5 = high

**Note:** Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1)

**Source:** Field Survey, 2023

As shown in Table 4.3, for affect of service, 52.5% of the respondents strongly agreed that majority of library personnel in their libraries understand users' information need; 43.6% of the respondents agreed; 4.0% of the respondents disagreed; and none of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.49. Also, 58.4% of the respondents agreed that majority of library personnel in their libraries were willing to help users; 39.1% of the respondents strongly agreed; 2.5% of the respondents disagreed; and none of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.37. In addition, 56.9% of the respondents agreed that majority of library personnel in their libraries gave users

individual attention; 38.6% of the respondents strongly agreed; 4.5% of the respondents disagreed; and none of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.34.

Also, as shown in Table 4.3, 62.9% of the respondents agreed that majority of library personnel in their libraries instilled confidence in users; 31.2% of the respondents strongly agreed; 5.4% of the respondents disagreed; and 0.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.25. For the last item on affect of service, 56.9% of the respondents agreed that majority of library personnel in their libraries had enough knowledge to answer user questions; 36.1% of the respondents strongly agreed; 6.4% of the respondents disagreed; and 0.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.29. The weighted mean has a value of 3.35 which suggest that the respondents agreed to high level of affect of service.

According to Table 4.3, for library as place, 52.5% of the respondents agreed that their libraries are conducive for study and learning; 46.0% of the respondents strongly agreed; 1.5% of the respondents disagreed; and none of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.45. For the next item, 53.0% of the respondents agreed that their libraries have separate spaces for individual and group activities; 39.6% of the respondents strongly agreed; 5.4% of the respondents disagreed; and 2.0% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.30. More so, 53.0% of the respondents agreed that their library buildings are located in a welcoming and comfortable environment; 44.6% of the respondents

strongly agreed; 2.0% of the respondents disagreed; and 0.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.42.

According to Table 4.3, 54.0% of the respondents agreed that their libraries (digital) have attractive and aesthetic features; 40.1% of the respondents strongly agreed; 4.5% of the respondents disagreed; and 1.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.33. For the last item on library as place, 56.9% of the respondents agreed that their libraries have comfortable furniture and equipment; 40.6% of the respondents strongly agreed; 2.0% of the respondents disagreed; and 0.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.38 which was high. The weighted mean has a value of 3.38 which also suggest that the respondents agreed to high level of library as place.

For information control, Table 4.3 shows that 53.5% of the respondents agreed that their libraries provide unrestricted access to electronic information resources; 39.6% of the respondents strongly agreed; 5.4% of the respondents disagreed; and 1.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.31. Also, 54.0% of the respondents agreed that their libraries have modern equipment that allow users to easily access needed information; 40.1% of the respondents strongly agreed; 5.4% of the respondents disagreed; and 0.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.34. Likewise, 56.9% of the respondents agreed that their libraries have access tools that allow users to find materials on their own; 40.6% of the respondents strongly agreed; 2.0% of the respondents disagreed; and 0.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.38.

As shown in Table 4.3, 54.0% of the respondents agreed that their libraries have website or information system that enhance quick access to needed information; 42.6% of the respondents strongly agreed; 2.0% of the respondents disagreed; and 1.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.38. For the last item on information control, 55.4% of the respondents agreed that their libraries make information resources easily accessible for individual use; 41.1% of the respondents strongly agreed; 3.5% of the respondents disagreed; and none of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.38. The weighted mean has a value of 3.36 which suggest that the respondents agreed to a high level of information control. The overall weighted mean for level of service quality provided by library personnel in academic libraries in federal universities in Southwest, Nigeria is 3.36. This suggests that there is high level of service quality by library personnel in academic libraries in federal universities in Southwest, Nigeria.

### **Interview Questions and responses**

#### **How would you rate the quality of service rendered by library personnel in this library?**

According to the University Librarian of University of Lagos:

Quality of service rendered to users are high due to the fact that the staff are well-trained and educated. However, the users are in the best position to evaluate the library personnel. From the feedback received so far from the users, the library personnel are offering topnotch service.

The University Librarian of Obafemi Awolowo University also mentioned that the service quality in the library is highly commendable. Likewise, the University Librarian

of Federal University of Technology, Akure noted that the service quality in the institution is excellent. However, the University Librarian of Federal University of Agriculture, Abeokuta had a slightly different opinion. In his words, the quality of service rendered is:

Moderately high, we are trying our best possible to render quality service. Most libraries in Nigeria are still work in progress and we can't compare ourselves to the developed countries.

This view is supported by the University Librarian of University of Ibadan, although, the interviewee said it is relative. Nevertheless, the University Librarian of Federal University, Oye-Ekiti stated that:

Though we are short-staff, the few staff on ground are trying their best to render quality service to the end users.

**How frequently do you receive complaint from students and staff about library services or library personnel?**

In his response, the University Librarian of University of Lagos stated that:

There is a feedback mechanism in place, we have a box where student and staff can drop their comments and complaint.

This is similar to the response from the University Librarian of Federal University, Oye-Ekiti who noted that:

The circulation desk is where the student interacts with staff. Except on rare cases that complaints are brought to the University Librarian.

Also, University Librarian of Federal University of Technology, Akure stated that they have good service relationship with their clientele. Another interviewee, University

Librarian of University of Ibadan, said suggestions, comments and feedback are received on a regular basis from users. However, University Librarian of Obafemi Awolowo University stated that they hardly receive any complaint from the students and staff. This is similar to the response from University Librarian of Federal University of Agriculture, Abeokuta who said:

We hardly receive complaint from students and staff. We often encourage and sensitize them on the benefit of reading.

**Research Question Two:** What is the perceived characteristics of cloud computing by library personnel in academic libraries in federal universities in Southwest, Nigeria?

**Table 4.4: Analysis Of Responses On Perceived Characteristics Of Cloud Computing By Library Personnel In Academic Libraries In Federal Universities In Southwest, Nigeria**

<b>Relative advantage</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Mean</b>
Using cloud computing is cost effective and can help the library reduce cost of infrastructure, saving financially	89 (44.1%)	107 (53.0%)	6 (3.0%)	0 (0.0%)	3.41
Adoption of cloud computing will provide a more protective environment than using library servers	66 (32.7%)	126 (62.4%)	10 (5.0%)	0 (0.0%)	3.28
Adoption of cloud computing improves the quality of library services than using other similar technologies	69 (34.2%)	120 (59.4%)	12 (5.9%)	1 (0.5%)	3.27
Libraries using cloud computing are seen as more advanced than those who use only stand-alone storage	68 (33.7%)	119 (58.9%)	13 (6.4%)	2 (1.0%)	3.25
<b>Weighted Mean</b>					<b>3.30</b>
<b>Compatibility</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Mean</b>
Cloud computing is easily compatible with the existing IT infrastructure in my library	78 (38.6%)	106 (52.5%)	15 (7.4%)	3 (1.5%)	3.28
I think using cloud computing fits well with the way my library has been operating	69 (34.2%)	120 (59.4%)	12 (5.9%)	1 (0.5%)	3.27
I have used other technologies similar to cloud computing	67 (33.2%)	118 (58.4%)	17 (8.4%)	0 (0.0%)	3.25
I have previous positive experience with the use of cloud computing	61 (30.2%)	127 (62.9%)	11 (5.4%)	3 (1.5%)	3.22
Cloud computing services have the right features to meet the types of services my library need to	68 (33.7%)	120 (59.4%)	12 (5.9%)	2 (1.0%)	3.26

provide					
<b>Weighted Mean</b>					<b>3.26</b>
<b>Complexity</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>Mean</b>
Using cloud computing is simple and straightforward	53 (26.2%)	131 (64.9%)	11 (5.4%)	7 (3.5%)	3.14
Any library personnel can easily learn how to make use of cloud computing services	63 (31.2%)	126 (62.4%)	9 (4.5%)	4 (2.0%)	3.23
Majority of cloud computing services usually come with easy to understand instructions	73 (36.1%)	108 (53.5%)	15 (7.4%)	6 (3.0%)	3.23
<b>Weighted Mean</b>					<b>3.20</b>
<b>Overall Weighted Mean</b>					<b>3.25</b>

**Decision rule: < 2.5 = low; 2.5 = moderate; > 2.5 = high**

**Note: Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1)**

**Source: Field Survey, 2023**

Based on the responses reported in Table 4.4, for relative advantage, 53.0% of the respondents agreed that using cloud computing is cost effective and can help the library reduce cost of infrastructure, saving financially; 44.1% of the respondents strongly agreed; 3.0% of the respondents disagreed; and none of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.41. Also, 62.4% of the respondents agreed that adoption of cloud computing will provide a more protective environment than using library servers; 32.7% of the respondents strongly agreed; 5.0% of the respondents disagreed; and none of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.28.

In addition, 59.4% of the respondents agreed that adoption of cloud computing improves the quality of library services than using other similar technologies; 34.2% of the respondents strongly agreed; 5.9% of the respondents disagreed; and 0.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.27. For the last item on relative advantage, 58.9% of the respondents agreed that

libraries using cloud computing are seen as more advanced than those who use only stand-alone storage; 33.7% of the respondents strongly agreed; 6.4% of the respondents disagreed; and 1.0% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.25. The weighted mean has a value of 3.30 which suggest that the respondents agreed to high level of relative advantage.

According to Table 4.4, for compatibility, 52.5% of the respondents agreed that cloud computing is easily compatible with the existing IT infrastructure in their libraries; 38.6% of the respondents strongly agreed; 7.4% of the respondents disagreed; and 1.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.28. For the next item, 59.4% of the respondents agreed that they think using cloud computing fits well with the way their libraries have been operating; 34.2% of the respondents strongly agreed; 5.9% of the respondents disagreed; and 0.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.27.

For the third item, 58.4% of the respondents agreed that they have used other technologies similar to cloud computing; 33.2% of the respondents strongly agreed; 8.4% of the respondents disagreed; and none of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.25. More so, 62.9% of the respondents agreed that they have previous positive experience with the use of cloud computing; 30.2% of the respondents strongly agreed; 5.4% of the respondents disagreed; and 1.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.22. For the last item on compatibility, 59.4% of the respondents agreed that cloud computing services have the right features to meet the types of services their

libraries need to provide; 33.7% of the respondents strongly agreed; 5.9% of the respondents disagreed; and another 1.0% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.26. The weighted mean has a value of 3.26 which also suggest that the respondents agreed to high level of compatibility.

For complexity, Table 4.4 shows that 64.9% of the respondents agreed that using cloud computing is simple and straightforward; 26.2% of the respondents strongly agreed; 5.4% of the respondents disagreed; and 3.5% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.14. Also, 62.4% of the respondents agreed that any library personnel can easily learn how to make use of cloud computing services; 31.2% of the respondents strongly agreed; 4.5% of the respondents disagreed; and 2.0% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.23.

According to Table 4.4, for the last item on complexity, 53.5% of the respondents agreed that majority of cloud computing services usually come with easy to understand instructions; 36.1% of the respondents strongly agreed; 7.4% of the respondents disagreed; and 3.0% of the respondents strongly disagreed. On the average, the responses indicate a mean value of 3.23. The weighted mean has a value of 3.20 which suggest that the respondents agreed to a high level of complexity as necessary consideration. The overall weighted mean for perceived characteristics of cloud computing by library personnel in academic libraries in federal universities in Southwest, Nigeria is 3.25. This suggests that perceived characteristics of cloud computing by library personnel in academic libraries in federal universities in Southwest, Nigeria is high.

## **Interview Questions and responses**

### **What are the areas where cloud computing can be useful for your library?**

The University Librarian of University of Lagos listed digital repository, LLM and resource provision (Databases). The University Librarian of Obafemi Awolowo University mentioned cataloguing, reference services and OAU Publications. Also, the University Librarian of Federal University of Agriculture, Abeokuta listed databases and KOHA. Likewise, the University Librarian of Federal University of Technology, Akure mentioned repository, databases and KOHA. In addition, the University Librarian of University of Ibadan noted that cloud computing is used virtually in every service rendered by the library. However, the University Librarian of Federal University, Oye-Ekiti stated that:

For now, the library is not fully engaged in the use of cloud computing. KOHA is used for cataloguing and classification.

### **What is the general perception of cloud computing among library personnel in this library?**

As stated by the University Librarian of University of Lagos:

The library has moved from the traditional method, and as stated earlier our staff are well-trained to fit into the current development and innovation. The perception of staff is positive. We don't have any staff with negative approach to cloud computing.

In another response, the University Librarian of Obafemi Awolowo University noted that the awareness level is still minimal. Nevertheless, the University Librarian of Federal University of Technology, Akure said it is highly efficient and they have positive attitude to cloud computing. Also, the University Librarian of Federal University of Agriculture,

Abeokuta said: “Change has always been an issue with people. I would say 60-70% embraced cloud computing, while others don’t have the technical know-how.”

In addition, the University Librarian of University of Ibadan noted that: “Most staff are becoming technology savvy. The old staff also are embracing the use of cloud computing services. Although, there was once an issue of technophobia but they are adjusting per time.”

The last respondent, the University Librarian of Federal University, Oye-Ekiti, stated that: “There is an in-house training for staff, where challenges are handled. Mostly, staff embraced cloud computing.”

**Research Question Three:** What is the level of digital literacy competency possessed by library personnel in academic libraries in federal universities in Southwest, Nigeria?

**Table 4.5: Analysis of responses on level of digital literacy competency possessed by library personnel in academic libraries in federal universities in Southwest, Nigeria**

<b>Information and data literacy</b>	<b>Very High Extent</b>	<b>High Extent</b>	<b>Low Extent</b>	<b>Very Low Extent</b>	<b>Mean</b>
I am able to articulate my information needs while using the internet	93 (46.0%)	100 (49.5%)	9 (4.5%)	0 (0.0%)	3.42
I am able to search for any digital content in online environments	76 (37.6%)	117 (57.9%)	8 (4.0%)	1 (0.5%)	3.33
I have the needed skills to analyze, compare and critically evaluate the credibility of sources I use	80 (39.6%)	109 (54.0%)	13 (6.4%)	0 (0.0%)	3.33
I have the needed skills to store, manage and organize digital information resources	83 (41.1%)	106 (52.5%)	11 (5.4%)	2 (1.0%)	3.34
<b>Weighted Mean</b>					<b>3.36</b>
<b>Communication and collaboration</b>	<b>Very High Extent</b>	<b>High Extent</b>	<b>Low Extent</b>	<b>Very Low Extent</b>	<b>Mean</b>
I have the needed skills to use the internet to connect with others using various digital devices and software	77 (38.1%)	107 (53.0%)	15 (7.4%)	3 (1.5%)	3.28
I have the needed skills to select appropriate digital technologies to share data, information and digital content	80 (39.6%)	105 (52.0%)	16 (7.9%)	1 (0.5%)	3.31
I have the needed skills to select relevant digital	82	101	13	6	3.28

tools and technologies for collaborative process	(40.6%)	(50.0%)	(6.4%)	(3.0%)	
I am aware of the proper mode of behavior while using digital technologies and interacting in digital environments	76 (37.6%)	109 (54.0%)	12 (5.9%)	5 (2.5%)	3.27
<b>Weighted Mean</b>					<b>3.29</b>
<b>Digital content creation</b>	<b>Very High Extent</b>	<b>High Extent</b>	<b>Low Extent</b>	<b>Very Low Extent</b>	<b>Mean</b>
I have the skills to create and edit digital content in different formats	84 (41.6%)	93 (46.0%)	19 (9.4%)	6 (3.0%)	3.26
I have the skills to modify, refine and integrate new information and content into an existing body of knowledge to create new, original and relevant content and knowledge	80 (39.6%)	94 (46.5%)	21 (10.4%)	7 (3.5%)	3.22
I can give understandable instructions to retrieve information from a computer system	74 (36.6%)	108 (53.5%)	13 (6.4%)	7 (3.5%)	3.23
I understand how copyright and licenses apply to data, information and digital content	80 (39.6%)	99 (49.0%)	19 (9.4%)	4 (2.0%)	3.26
<b>Weighted Mean</b>					<b>3.24</b>
<b>Overall Weighted Mean</b>					<b>3.30</b>

**Decision rule:** < 2.5 = low; 2.5 = moderate; > 2.5 = high

**Note:** Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1)

**Source:** Field Survey, 2023

As shown in Table 4.5, for information and data literacy, 49.5% of the respondents agreed to a high extent that they were able to articulate their information needs while using the internet; 46.0% of the respondents to very high extent; 4.5% of the respondents to low extent; and none of the respondents to very low extent. On the average, the responses indicate a mean value of 3.42. Also, 57.9% of the respondents agreed to a high extent that they were able to search for any digital content in online environments; 37.6% of the respondents to very high extent; 4.0% of the respondents to low extent; and 0.5% of the respondents to very low extent. On the average, the responses indicate a mean value of 3.33.

In addition, 54.0% of the respondents agreed to a high extent that they have the needed skills to analyze, compare and critically evaluate the credibility of sources they use; 39.6% of the respondents to very high extent; 6.4% of the respondents to low extent; and none of the respondents to very low extent. On the average, the responses indicate a mean

value of 3.33. For the last item on information and data literacy, 52.5% of the respondents agreed to a high extent that they have the needed skills to store, manage and organize digital information resources; 41.1% of the respondents to very high extent; 5.4% of the respondents to low extent; and 1.0% of the respondents to very low extent. On the average, the responses indicate a mean value of 3.34. The weighted mean has a value of 3.36 which suggest that the respondents agreed to high level of information and data literacy.

According to Table 4.5, for communication and collaboration, 53.0% of the respondents agreed to a high extent that they have the needed skills to use the internet to connect with others using various digital devices and software; 38.1% of the respondents to very high extent; 7.4% of the respondents to low extent; and 1.5% of the respondents to very low extent. On the average, the responses indicate a mean value of 3.28. For the next item, 52.0% of the respondents agreed to a high extent that they have the needed skills to select appropriate digital technologies to share data, information and digital content; 39.6% of the respondents to very high extent; 7.9% of the respondents to low extent; and 0.5% of the respondents to very low extent. On the average, the responses indicate a mean value of 3.31.

More so, 50.0% of the respondents agreed to a high extent that they have the needed skills to select relevant digital tools and technologies for collaborative process; 40.6% of the respondents to very high extent; 6.4% of the respondents to low extent; and 3.0% of the respondents to very low extent. On the average, the responses indicate a mean value of 3.28. According to Table 4.5, for the last item on communication and collaboration, 54.0% of the respondents agreed to a high extent that they were aware of the proper mode

of behavior while using digital technologies and interacting in digital environments; 37.6% of the respondents to very high extent; 5.9% of the respondents to low extent; and 2.5% of the respondents to very low extent. On the average, the responses indicate a mean value of 3.27. The weighted mean has a value of 3.29 which also suggest that the respondents agreed to high level of communication and collaboration.

For digital content creation, Table 4.5 shows that 46.0% of the respondents agreed to a high extent that they have the skills to create and edit digital content in different formats; 41.6% of the respondents to very high extent; 9.4% of the respondents to low extent; and 3.0% of the respondents to very low extent. On the average, the responses indicate a mean value of 3.26. Also, 46.5% of the respondents agreed to a high extent that they have the skills to modify, refine and integrate new information and content into an existing body of knowledge to create new, original and relevant content and knowledge; 39.6% of the respondents to very high extent; 10.4% of the respondents to low extent; and 3.5% of the respondents to very low extent. On the average, the responses indicate a high mean value of 3.22.

In addition, 53.5% of the respondents agreed to a high extent that they can give understandable instructions to retrieve information from a computer system; 36.6% of the respondents to very high extent; 6.4% of the respondents to low extent; and 3.5% of the respondents to very low extent. On the average, the responses indicate a mean value of 3.23. As shown in Table 4.5, for the last item on digital content creation, 49.0% of the respondents agreed to a high extent that they understand how copyright and licenses apply to data, information and digital content; 39.6% of the respondents to very high extent; 9.4% of the respondents to low extent; and 2.0% of the respondents to very low

extent. On the average, the responses indicate a mean value of 3.26. The weighted mean has a value of 3.24 which suggest that the respondents agreed to a high level of digital content creation. The overall weighted mean for the level of digital literacy competency possessed by library personnel in academic libraries in federal universities in Southwest, Nigeria is 3.30. This result also suggests that there is high level of digital literacy competency possessed by library personnel in academic libraries in federal universities in Southwest, Nigeria.

### **Interview Questions and responses**

#### **How would you rate the digital literacy competency of library personnel in this library?**

The University Librarian of University of Lagos responded that the digital literacy level is moderately above average. Also, the University Librarian of Obafemi Awolowo University said it is moderately okay. The University Librarian of Federal University of Agriculture, Abeokuta noted that it is moderately high. Likewise, the University Librarian of Federal University of Technology, Akure said:

It is high, because no librarian will desire to be left behind in this digital age.

The University Librarian of University of Ibadan noted that:

The competency level is growing by the day due to the rapid and sporadic influx of information technology.

The last respondent, the University Librarian of Federal University, Oye-Ekiti, stated that:

It is mandatory for every librarian to be ICT compliant to stay relevant. Therefore, staff are not relenting to update their knowledge.

#### **How positive or negative is the feedback received from library users?**

According to the University Librarian of University of Lagos:

Both positive and negative feedback were received. But I can't quantify that. We receive positive comments that encourage library staff and also, we receive constructive criticism which is meant for us to offer more quality service.

The University Librarian of Obafemi Awolowo University noted that, on a general perspective, it's positive. Also, the University Librarian of Federal University of Agriculture, Abeokuta stated that they received 78% positive feedback. In his words, the University Librarian of Federal University of Technology, Akure said:

The feedback is really positive, because we have one of the best libraries around the State. In addition, the University Librarian of University of Ibadan stated that:

There are positive feedback concerning the type and nature of electronic services offered by the library, while some also showed their displeasure, most especially when there are issues with internet connectivity and power outage. Overall, the positive feedback is high than the negative feedback.

In conclusion, the University Librarian of Federal University, Oye-Ekiti noted that:

Most of this feedback end up on the desk of the circulation librarian, although we can't satisfy all users. So far, positive feedback is on the high side.

### **4.3 Test of Hypotheses**

This section covers the regression analyses carried out on hypotheses one to four. Linear regression analysis was adopted, and the pre-set and acceptable level of significance for this study was 0.05.

**H<sub>0</sub>1: There will be no significant relationship between characteristics of cloud computing and service quality of library personnel in academic libraries in federal**

universities in Southwest, Nigeria. The above null hypothesis was tested using simple linear regression analysis. Data measuring service quality of library personnel were regressed on data measuring perceived characteristics of cloud computing. The results of the regression analysis are presented in Tables 4.6 a, b and c below.

**Table 4.6: Regression Analysis for Influence of Perceived Characteristics of Cloud Computing on Service Quality of Library Personnel in Academic Libraries in Federal Universities in Southwest, Nigeria**

**a. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.536 <sup>a</sup>	.287	.284	.29752

a. Predictors: (Constant), Perceived Characteristics

**b. ANOVA<sup>b</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.137	1	7.137	80.631	.000 <sup>a</sup>
	Residual	17.703	200	.089		
	Total	28.841	201			

a. Predictors: (Constant), Characteristics

b. Dependent Variable: Service Quality

**c. Coefficients<sup>a</sup>**

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.728	.183		9.462	.000
	<b>Perceived Characteristics</b>	.500	.056	.536	8.979	.000

a. Dependent Variable: Service Quality

**Source: Field Survey, 2023**

Tables 4.6a shows that characteristics of cloud computing have a moderate and positive correlation ( $R = 0.536$ ) with service quality of library personnel in academic libraries in

federal universities in Southwest, Nigeria. Also, the coefficient of determination (Adj.  $R^2 = 0.284$ ) shows that perceived characteristics of cloud computing explains 28.4% of the total variance in service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. The remaining 71.6% variation in service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is explained by other factors not investigated in this study. Table 4.6b shows the overall significance of the model ( $F(1, 200) = 80.631, p < 0.05$ ). In addition, Table 4.6c shows that, if all other factor is constant, a unit change in characteristics of cloud computing will lead to 0.50 increase in the service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria at 95% level of confidence ( $B = 0.500, p < 0.05$ ). Hence, based on the result of the regression analysis, the null hypothesis one, which states that there will be no significant relationship between characteristics of cloud computing and service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is rejected.

**H<sub>02</sub>:** There will be no significant relationship between digital literacy competency and service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria.

The second null hypothesis was also tested using simple linear regression analysis. Data measuring service quality of library personnel were regressed on data measuring digital literacy competency. The results of the regression analysis are presented in Tables 4.7 a, b and c below.

**Table 4.7: Regression analysis for influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria**

a. **Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.515 <sup>a</sup>	.265	.262	.30207

b. Predictors: (Constant), Digital Literacy Competency

b. **ANOVA<sup>b</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.592	1	6.592	72.241	.000 <sup>a</sup>
	Residual	18.249	200	.091		
	Total	24.841	201			

a. Predictors: (Constant), Digital Literacy Competency

b. Dependent Variable: Service Quality

c. **Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.
		B	Std. Error	Beta			
1	(Constant)	2.049	.155			13.181	.000
	Digital Literacy Competency	.397	.047	.515		8.499	.000

a. Dependent Variable: Service Quality

**Source: Field Survey, 2023**

Tables 4.7a reveals that digital literacy competency has a moderate and positive correlation ( $R = 0.515$ ) with service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. Also, the coefficient of determination ( $\text{Adj. } R^2 = 0.262$ ) shows that digital literacy competency explains 26.2% of the total variance in service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. The other 73.8% variation in service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is explained by factors not investigated in this study. Table 4.7b shows that, overall, the model is significant ( $F(1,$

200) = 72.241,  $p < 0.05$ ). More so, Table 4.7c shows that, if all other factor is constant, a unit change in digital literacy competency will lead to 0.397 increase in the service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria at 95% level of confidence ( $B = 0.397$ ,  $p < 0.05$ ). Therefore, according to the result of the regression analysis, the null hypothesis two, which states that there will be no significant relationship between digital literacy competency and service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is rejected.

**H<sub>03</sub>:** There will be no significant joint influence of characteristics of cloud computing and digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria.

Multiple linear regression analysis was used to test the third null hypothesis. Data measuring service quality of library personnel were regressed on data measuring characteristics of cloud computing and digital literacy competency. The results of the regression analysis are shown in Tables 4.8 a, b and c.

**Table 4.8: Regression Analysis for Influence of Characteristics of Cloud Computing and Digital Literacy Competency on Service Quality of Library Personnel in Academic Libraries in Federal Universities in Southwest, Nigeria.**

**a. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.589 <sup>a</sup>	.347	.340	.28555

a. Predictors: (Constant), Digital Literacy Competency, Characteristics

**b. ANOVA<sup>b</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8.615	2	4.307	52.827	.000 <sup>a</sup>
	Residual	16.226	199	.082		

	Total	24.841	201			
--	-------	--------	-----	--	--	--

- a. Predictors: (Constant), Digital Literacy Competency, Characteristics  
b. Dependent Variable: Service Quality

c. Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
1	(Constant)	1.507	.183		8.237	.000
	Characteristics	.332	.067	.355	4.981	.000
	Digital Literacy Competency	.234	.055	.304	4.257	.000

. Dependent Variable: Service Quality  
Source: Field Survey, 2023

The presentations in Table 4.8 reveals the results of the third null hypothesis. According to Table 4.8a, characteristics of cloud computing and digital literacy competency have moderate and positive correlation ( $R = 0.589$ ) with service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. More so, perceived characteristics of cloud computing and digital literacy competency explain 34.0% ( $\text{Adj. } R^2 = 0.340$ ) of the total variance in service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. Factors not investigated in this study explained the other 66.0% variation in service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. Also, Table 4.8b shows that the overall model is significant ( $F(2, 199) = 52.827, p < 0.05$ ).

In addition, Table 4.8c shows that for the combined influence on the service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria, at

95% level of confidence, if all other factor are constant, a unit change in characteristics of cloud computing will lead to 0.332 increase in the service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria ( $B = 0.332, p < 0.05$ ). Also, for the combined influence on the service quality, given that all other factors remain constant at 95% level of confidence, a unit change in digital literacy competency will lead to 0.234 increase in the service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria ( $B = 0.234, p < 0.05$ ). Therefore, based on the results of the regression analysis, the null hypothesis three which states that will be no significant joint influence of characteristics of cloud computing and digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is hereby rejected.

**H<sub>04</sub>:** There will be no significant moderating impact of rank/cadre on the influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria.

The results of the regression analysis are shown in Tables 4.9 a, b and c.

**Table 4.9: Regression analysis for moderating impact of rank/cadre on the influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria.**

**a. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	Sig. F Change
<b>1</b>	.522 <sup>a</sup>	.273	.265	.30134	.273	37.282	0.000
<b>2</b>	.591 <sup>b</sup>	.349	.339	.28573	.077	23.328	0.000

a. Predictors: (Constant), Rank/Cadre, Digital Literacy Competency

b. Predictors: (Constant), Rank/Cadre, Digital Literacy Competency, Moderating Impact

**b. ANOVA<sup>c</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.771	2	3.385	37.282	.000 <sup>a</sup>
	Residual	18.070	199	.091		
	Total	24.841	201			
2	Regression	8.675	3	2.892	35.420	.000 <sup>b</sup>
	Residual	16.165	198	.082		
	Total	24.841	201			

a. Predictors: (Constant), Rank/Cadre, Digital Literacy Competency

b. Predictors: (Constant), Rank/Cadre, Digital Literacy Competency, Moderating Impact

c. Dependent Variable: Service Quality

**c. Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients		T	Sig.
	B	Std. Error	Beta			
1	(Constant)	2.033	.155		13.076	.000
	Digital Literacy Competency	.419	.049	.543	8.535	.000
	Rank/Cadre	-.017	.012	-.089	-1.405	.162
2	(Constant)	3.081	.262		11.745	.000
	Digital Literacy Competency	.089	.083	.116	1.083	.280
	Rank/Cadre	-.385	.077	-2.000	-4.998	.000
	Moderating Impact	.112	.023	2.101	4.830	.000
<b>a. Dependent Variable: Service Quality</b>						

**d. Excluded Variables<sup>b</sup>**

Model		Beta In	T	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	Moderating Impact	2.101 <sup>a</sup>	4.830	.000	.325	.017

a. Predictors in the Model: (Constant), Rank/Cadre, Digital Literacy Competency

b. Dependent Variable: Service Quality

**Source: Field Survey, 2023**

The results of the fourth null hypothesis are presented in Table 4.9. As shown in Table 4.9a, the interaction effect has moderate and positive correlation ( $R = 0.591$ ) with service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. Also, the interaction effect between rank/cadre and digital literacy competence has significantly increased the percentage of total variance accounted for in the service quality of library personnel in academic libraries of federal universities in Southwest, Nigeria by 7.7% ( $R^2$  Change = 0.077,  $p < 0.05$ ). More so, Table 4.9b shows the overall significance of the models and indicates that R square values of model 1 ( $F(2, 199) = 37.282$ ,  $p < 0.05$ ) and model 2 ( $F(3, 198) = 35.420$ ,  $p < 0.05$ ) are significant.

Also, at 95% level of confidence, if all other factor is constant, Table 4.9c shows that a unit change in the interaction effect between rank/cadre and digital literacy competence will lead to 0.112 increase in the service quality of library personnel in academic libraries of federal universities in Southwest, Nigeria ( $B = 0.112$ ,  $p < 0.05$ ). In addition, Table 4.9d indicates that the interaction effect between rank/cadre and digital literacy competence has a low but significant partial correlation with service quality of library personnel in academic libraries of federal universities in Southwest, Nigeria ( $r = 0.325$ ,  $p < 0.05$ ). Therefore, based on the results of the analysis, the null hypothesis four which states that there will be no significant moderating impact of rank/cadre on the influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is hereby rejected.

### **4.3. Discussion of Findings**

To start with the first research question, the study found that the overall weighted mean for level of service quality provided by library personnel in academic libraries in federal universities in Southwest, Nigeria is 3.36. This suggests that there is high level of service quality by library personnel in academic libraries in federal universities in Southwest, Nigeria. In other word, the study found high service quality services provision. The finding from the descriptive statistic is corroborated by the interviewees responses which shows that staff although not enough were able to render quality services to the best of their capacities. To corroborate this study, a study describes the results of a study to examine the perception of academic staff on the quality of academic library services. It also attempts to assess the impact of library services on their work and their perceived level of satisfaction towards university library services. Using the SERVQUAL dimensions. Findings – Results reveal that academic staff perceive the quality of library services to be just above average. Library staff are considered quite helpful and able to instill confidence in library users. Academic staff also believe that the library has a positive impact on their teaching, learning and research. The overall satisfaction with the library services received a satisfactory rating<sup>1</sup>. This is however negated by a study that aimed at determining how the quality of service of a library. Data taken using a questionnaire developed from the SERVQUAL, where the number of respondents as many as 125 people. From the analysis, tangible components of quality of service already exceeded expectations, while for components reliability, responsiveness, assurance and empathy, the service quality value is still below the expected value<sup>2</sup>. Furthermore, a study that aimed at assessing the performance of libraries at the Islamic Azad University, Sciences and Research Branch (IAUSRB) through gap analysis. Five service quality

categories, were included in the questionnaire: "Environment, equipment and physical facilities", "Public services", "Non-book materials", "Staff (librarians and their co-workers)", and "Information literacy and use education". Based on research findings, the most expected library services prioritized by users are "operation time" (mean = 4.2300), "staff" (mean = 4.1461), and "circulation" (mean = 4.1208), while the least expected library services which are of lower importance from users' perspective are "press" (mean = 3.9734) and "audiovisual materials" (mean = 3.8796). The findings also indicate that services offered by the libraries surveyed had a relatively quality performance and average success (perceived quality is 2.9635≈50%). In other words, such a finding emphasizes an average performance of IAUSRB libraries. In addition, confirming five research hypotheses concerning gap analysis, there was a significant difference between expected quality of five service categories and their perceived quality based on users' viewpoint. It was also realized that the categories with better performance or perceived quality from users' perspective are "staff" (mean = 3.2240), "information literacy and user education" (mean = 2.9998), and "environment, equipment and physical facilities" (mean = 2.9871), and the two libraries "Theology and Philosophy" (mean = 2.2639) and "Medical Engineering" (mean = 2.4507) have offered poor services than the other IAUSRB libraries<sup>3</sup>.

Whether for or against, an ideal library has a very important role in the learning process, both for primary, secondary and higher education level. So, the main function of the library is to serve students and educators or users of outside education in finding a reference to a sub-field of science or science they are studying. For that, a library that can serve, have references required by the user, can read books and learn in library room. The

comfort room and amenities will be a good service value. Library staff who serve also reinforce a good service system. E-library services connected with a variety of e-library of agencies in the country and abroad will be an added value to the quality of library services.

For the second research question, the descriptive statistics revealed that the overall weighted mean for characteristics of cloud computing by library personnel in academic libraries in federal universities in Southwest, Nigeria is 3.25. This suggests that characteristics of cloud computing by library personnel in academic libraries in federal universities in Southwest, Nigeria is high. This also is supported by the qualitative report where the library personnel interviewed asserted that library have moved from traditional to digital systems and library personnel in a bid to be relevant must attuned to the used of technological innovations in all aspects. In corroboration with the findings of this study, A questionnaire-based study conducted to identify the awareness and applications of cloud computing in libraries in Indian context. It is found that most of the respondents (98.2%) are aware of the term cloud computing and 87.7% of the respondents are aware of the application of cloud computing in libraries. Half of the respondents (52.6%) are of the opinion that it is feasible to apply cloud computing in libraries in Indian context<sup>4</sup>. More so, a study investigated awareness and use of cloud computing; its implications by libraries in selected academic libraries in Imo State, Nigeria. Findings reveal that there is certain level of awareness on cloud computing technologies and models in the libraries studied. It was also discovered that cloud computing technology were used by libraries in the institutions studied, and economy of resource, cost effectiveness and file sharing are

some of the major positive implications of library personnel's adoption of cloud computing technologies. However, security and privacy, multiple taxation were also identified as major negative implications of cloud computing adoption by the library personnel in discharging their functions in the libraries<sup>5</sup>.

To support the findings of this study, it was asserted by some scholars that Cloud computing provides characteristics such as Internet-based computing, heterogeneity, on-demand self-service, pay per use model, location-independent resource pooling, availability, scalability, and ubiquitous network access<sup>6</sup>. Cloud computing features flexibility, pay-per-use, and elasticity, enabling users to define software requirements and leverage elastic infrastructures within their application domains<sup>7</sup>. Cloud computing characteristics include elasticity, scalability, hardware virtualization, and fast service configuration<sup>8</sup>. Common characteristics of cloud computing include on-demand scalability, secure access to metered services, and displacement of data and services from inside to outside the organization<sup>9</sup>.

For the third research question, the overall weighted mean for the level of digital literacy competency possessed by library personnel in academic libraries in federal universities in Southwest, Nigeria is 3.30. This quantitative result also suggests that there is high level of digital literacy competency possessed by library personnel in academic libraries in federal universities in Southwest, Nigeria. Supported by qualitative reports, it is believed that library personnel are moderately competent in terms of digital competence. However, it was noted that library is a growing organism, library personnel must also grow digitally to meet the need of the moment.

Contradicting this report, a survey uncovered deficiencies in computer literacy among library personnel and insufficiencies in training initiatives. In summary, the study highlights the varied and extensive training requirements of library personnel, which extend beyond ICT skills. These requirements include management, communication, teaching, attitude development, and subject knowledge. They also stress the necessity of continuous education and training programs to increase the professionalism of LIS practitioners<sup>10</sup>. According to a scholar, the integration of Information and Communication Technology (ICT) into library services has presented libraries with a significant potential to meet the demands and desires of their customers. The study confirmed that the extent of ICT use in library operations has a substantial impact on the quality of library services provided by both Jiangsu University (JU) library and University of Ghana (UG) library. ICT skills are essential for library personnel in order to provide successful and efficient library services in the 21st century<sup>11</sup>.

A study revealed that library personnel possess ICT skills such as web application skills, library networking skills, and cloud technology skills. Additionally, the study found a significant correlation between web application skills, library networking skills, cloud technology skills, and the efficient delivery of library services. This implies that library personnel who possess ICT skills will be highly proficient in providing services to consumers<sup>12</sup>. In addition, contradicting this study, another study conducted on the Impact of ICT skills on the job performance of library personnel in university libraries of South-South, Nigeria revealed that a significant number of respondents lacked proficiency in system management, web application, and various tools including system troubleshooting, webinar/digital conferencing tools, Web 2.0, website designing, and digital

communication<sup>13</sup>. Although the survey documented a significant degree of ICT literacy abilities among library personnel, it is important to acknowledge that technology is always advancing, necessitating ongoing training and retraining to maintain relevance.

The test of Hypothesis one found that ( $B = 0.500, p < 0.05$ ). Hence, based on the result of the regression analysis, the null hypothesis one, which states that there will be no significant relationship between characteristics of cloud computing and service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is rejected. Generally, the obstructive nature of technological innovation has cut across all profession basically because of the several advantages it possesses. Scholars in Ethiopia asserted that Education institutions worldwide have become heavily reliant on information technology to meet their teaching, learning, service delivery, and commercial needs. Cloud computing is an emerging trend and technology that can be considered as a third-party revolution following the advent of computers and the internet. It enhances the capabilities of distributed computing, parallel computing, grid computing, and distributed databases, hence improving the functionality of digital libraries. Cloud computing enables the separation of infrastructure development for service supply from the library of offering end user services. Cloud computing enables the sharing of remote resources and services among several organizations or sites. Cloud computing involves the sharing of distributed resources over a network in an open environment. Digital libraries encounter several technical and service issues, as well as numerous advantages compared to traditional libraries. These factors contribute to the practical requirements of cloud computing. The particular advantages of cloud computing have had a significant impact

on the information resources, users, personnel, and facilities of digital libraries, ultimately driving their expansion. Libraries in developed countries such as Ethiopia may soon establish and oversee their own data centers. Various models demonstrate that libraries exert greater authority over the applications and data repositories that house confidential and private information pertaining to users. The provisioning and management of infrastructure for a web-based digital library pose numerous issues. This study addresses the challenges encountered in the realm of digital libraries and explores the strategies employed to overcome these obstacles. Infrastructure virtualization and cloud computing are appealing options that face challenges due to the increasing size of the indexed document collection, the introduction of new capabilities, and most notably, consumption. The integration of Cloud Computing into university libraries will greatly enhance the services offered, leading to significant advancements in the near future. Libraries will enhance their services to prioritize the needs and preferences of users, while also improving their professionalism and effectiveness. We firmly believe that the implementation of Cloud Computing in libraries will greatly enhance the knowledge benefits for Ethiopia<sup>14, 15, 16</sup>.

The test of hypothesis two ( $\text{Adj. } R^2 = 0.262$ ) shows that digital literacy competency explains 26.2% of the total variance in service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria. Therefore, according to the result of the regression analysis, the null hypothesis two, which states that there will be no significant relationship between digital literacy competency and service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is rejected. Of course, digital competence has been of significant influence to services rendering

organization in positive ways. For instance, in support of the findings of this study, a study examined the impact of ICT skills on service quality in the banking industry in Kuwait showed that there are significant differences between the perceptions of the customers of the three Islamic banks in relation to the technology dimension. The statistical significance of the alternative hypothesis was seen in the P-value (P-value = .000). The alternative hypothesis is, therefore accepted, which implies that there are differences between the customers of KFH, KIB, and Boubyan Bank in regarding technology dimensions as indicators of service quality. The study found that employees' ICT skills had a significant positive effect on service quality. This means that the quality of services they rendered is an off-shoot of the various ICT skills acquired over time<sup>17</sup>. Moreso, Digital competence development in library personnel helps them solve social and professional problems, upgrade skills in digital technologies, and adapt professional knowledge to changing digital society<sup>18</sup>.

Also, for the combined influence on the service quality, given that all other factors remain constant at 95% level of confidence, a unit change in digital literacy competency will lead to 0.234 increase in the service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria ( $B = 0.234, p < 0.05$ ). Therefore, based on the results of the regression analysis, the null hypothesis three which states that there will be no significant joint influence of perceived characteristics of cloud computing and digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is hereby rejected. This means that both cloud computing and the digital competences of the library personnel will definitely, certainly and positively enhance quality services rendered. Therefore, library should embrace,

acquire and create an atmosphere for cloud computing to thrive by providing necessary technological apparatus and also embark on regular staff development programs in the aspect of digital competence.

Hypothesis four shows that the interaction effect between rank/cadre and digital literacy competence has a low but significant partial correlation with service quality of library personnel in academic libraries of federal universities in Southwest, Nigeria ( $r = 0.325$ ,  $p < 0.05$ ). Therefore, based on the results of the analysis, the null hypothesis four which states that there will be no significant moderating impact of rank/cadre on the influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria is hereby rejected. This means that a weak interaction of rank/cadre and digital literacy in relation to digital literacy influence on service quality was found. The rank/cadre of library staff mediated the influence of digital literacy of library personnel on service quality. The implication of this is that the quality of services rendered is greatly dependent on the competence of staff members, therefore, every cadre should be taken into consideration in terms of staff developmental programs and training. The lower and the higher cadre should be given maximum and due consideration while implementing training programs.

#### Endnotes

1. K. Kiran, *Service quality and customer satisfaction in academic libraries: Perspectives from a Malaysian university*. **Library Review**, 59, 2010, 261-273. <https://doi.org/10.1108/00242531011038578>.
2. R. Panday, *Service quality of library toward an international college quality*. . <https://doi.org/10.31227/osf.io/34kyf>. 2018
3. F.Babalhavaeji, A. Isfandyari-Moghaddam, S. Aqili, & A. Shakooii, *Quality assessment of academic library performance: the case of an Iranian academic library*. **Malaysian Journal of Library & Information Science**, 14, 2017, 51-81.

4. K. Mahalakshmi, & S. Sornam, *Awareness and application of cloud computing in Indian libraries: A study among librarians of engineering colleges of coimbatore district*. 2012 International Conference on Cloud Computing Technologies, Applications and Management (ICCCTAM), 2012, 114-118.
5. L. Njoku, & E. Ken-Agbiriogu, *Awareness and use of cloud computing: its implications in selected academic libraries in Imo state, Nigeria*. **Information Impact: Journal of Information and Knowledge Management**. <https://doi.org/10.4314/ijikm.v12i1.5>. 2021
6. S. Kaur, G. Kaur, & M. Shabaz, *A secure two-factor authentication framework in cloud computing*. **Security and Communication Networks**. <https://doi.org/10.1155/2022/7540891>. 2022
7. M.Caballer, G. Moltó, & I. Blanquer, *Guest editor's introduction: Special issue on cloud computing orchestration*. **Journal of Grid Computing**, 16, 1-2. <https://doi.org/10.1007/s10723-018-9427-5>. 2018
8. W. Li, P. Zhang, & Z. Yang, *A framework for self-healing service compositions in cloud computing environments*. 2012 IEEE 19th International Conference on Web Services, 2012, 690-691. <https://doi.org/10.1109/ICWS.2012.109>.
9. T. Grance, , & W. Jansen, *Guidelines on security and privacy in public cloud computing* NIST. <https://doi.org/10.6028/nist.sp.800-144>. 2012
10. K.G., Akers, *Report from the medical library association's insight initiative summit 2: meeting the evolving information needs of library stakeholders*. **Journal of the Medical Library Association: JMLA**, 107(2), 2019. p.137.
11. F. K., Essien, Z. Lu, P. Abredu, & I. K. Zotoo, *Effect of ICT use on library service delivery: A comparative approach from two universities*. **Open Access Library Journal**, 9(5), 2022. 1-22.
12. G. N. Daniels, H. I. Wiche, & O. Nsirim, *Librarians ICT skills and effective library service delivery in university libraries in rivers state*. **Library Philosophy and Practice**, 2023. 1-22.
13. G. O., Oyovwe-Tinuoye, S. U., Omeluzor, & I. O. Patrick, *Influence of ICT skills on job performance of librarians in university libraries of South-South, Nigeria*. **Information Development**, 37(3), 2021, 345-358.
14. G. Dagnaw, & S. Tsigie, *Function of cloud computing in digital library perspective: in case of ethiopia higher education institution*; **Critical Review**. , 7, 2019, 88. <https://doi.org/10.11648/J.IOTCC.20190704.11>.
15. Z. Deng, *Research on service innovation of library in big data age*. 2017

16. J. Araujo, P. Maciel, M. Torquato, G. Callou, & E. Andrade, *Availability evaluation of digital library cloud services*. 2014 44th Annual IEEE/IFIP International Conference on Dependable Systems and Networks, 2014, 666-671. <https://doi.org/10.1109/DSN.2014.65>.
17. K. Al-Fawaz, Z. Al-Salti, & T. Eldabi, *The impact of ICT skills on service quality in the banking industry in Kuwait*. **Journal of Enterprise Information Management**, 23(1), 2010. 52-69.
18. R. Baryshev, *Building the model of academic library an digital competences*. **Scientific and Technical Libraries**. <https://doi.org/10.33186/1027-3689-2021-9-129-149>

## Chapter Five

### Conclusion

#### 5.1 Summary of Findings

The study has reviewed various concepts alongside Service Quality among Library Personnel in Federal Universities. Many researches about the factors that promote service quality have been bolstered by the emphasis on service quality that is also prevalent globally. Service quality is an evaluation of how well a service lives up to the customer's expectations. Additionally, service quality has been defined as the extent to which a particular service adheres to client requirements. Service quality has long been a topic of interest to all stakeholders in all sectors.

This study is anchored on Innovation Diffusion Theory. The theory was developed to explain how individuals and groups come to accept new innovations being introduced to

them. The theory categorizes innovation adoption based on how quickly (or slow) the target users eventually accept innovations. It also seeks to explain the stages an innovation has to go through before it is finally adopted by the target users. In addition, it outlines the factors or criteria adopted by potential users in evaluating information systems before they make the decision to adopt or reject a new innovation. The first focus of the theory is to identify various categories of innovation adopters. These are identified as; Innovators which describes those who seem to be open to challenges and the first to attempt new ideas. There are also those who are categorized as early adopters which include all those who are interested in exploring new technologies and demonstrating their values in the society.

The descriptive survey research design and a mixed method approach was adopted for this study. The population was 243 library personnel (237 library personnel & 6 university librarians) from federal universities in southwest of Nigeria. Total enumeration was used. Self-developed questionnaires were used to elicit response from 237 respondents of the sampled universities, while 6 University Librarians were interviewed accordingly. The demographic and quantitative data collected through the main research instrument which is the questionnaire were analyzed using descriptive statistics such as simple percentages, mean and standard deviations while thematic was used for the qualitative data. In addition, the study hypotheses were tested at 0.05 level of significance using Regression analysis. The IBM SPSS software version 24 was used to analyze the data. The results were extensively discussed in the context of the current research as well as extant literature.

The findings of the study can be summarized as follows:

1. There is high level of service quality by library personnel in academic libraries in federal universities in Southwest, Nigeria, however, there is room for improvement on the part of the management and staff.
2. There is a feedback mechanism in place, however, there is need to continuously encourage and sensitize students on the benefit of reading.
3. Perceived characteristics of cloud computing by library personnel in academic libraries in federal universities in Southwest, Nigeria is high.
4. There is high level of digital literacy competency possessed by library personnel in academic libraries in federal universities in Southwest, Nigeria.
5. Characteristics of cloud computing and digital literacy competency have moderate and positive correlation with service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria.
6. There is significant moderating impact of rank/cadre on the influence of digital literacy competency on service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria.

## **5.2 Conclusion**

The study examined the Characteristics of Cloud Computing and Digital Literacy Competency as Determinants of Service Quality among Library Personnel in Federal Universities in South-west Nigeria. The main focus of businesses and service providers has thus shifted to providing high-quality services to their customers to achieve the objectives they have set for themselves, such as to make profit, remain competitive over the long term, or ensure customer satisfaction. Therefore, the first step in keeping users in today's cutthroat marketplace is to evaluate service quality. Each organization, whether,

they are concerned with profit making or simply providing services for public benefit, are well aware of the need to re-evaluate the scope and quality of services they offer and develop systems to ensure that their services continue to meet users' expectation. Although academic libraries do not offer services to gain profits, they are also concerned about the quality of services they offer their clients. Academic library services revolve around the gathering, organization, preservation, interpretation, and dissemination of information to support their clients in their quest to create more knowledge. To achieve this, libraries offer services such as reference services (both online and offline), circulation services, research advisory services, bibliographic completion, indexing and abstracting services, information retrieval services, and a host of other services targeted at ensuring that the information needs of their clients are met adequately. Many organizations, including libraries, have therefore shifted their focus to the adoption of cloud services. Technological advancements have provided opportunities to transform library services and operations from a lethargic and indifferent state to a more proactive and result-oriented state. Cloud computing is one of the leading information and communication technologies that is currently bolstering and enhancing library services and activities. Based on the empirical findings, this study concluded that characteristics of cloud computing and digital literacy competency have moderate and positive correlation with service quality of library personnel in academic libraries in federal universities in Southwest, Nigeria.

### **5.3 Recommendations**

The goal of every research is to add value to the body of knowledge and promote society's general development by producing fresh information that will either improve

the current situation or provide new ideas and techniques for solving problems. Based on the findings in this study, the following recommendations were made:

- 1.The management should frequently organize an awareness program for staff to fit into the current development and innovation.
- 2.Library personnel in the federal universities in Southwest, Nigeria should endeavor to engage in training unceasingly so as to stay relevant in the everchanging world.
- 3.Library personnel in federal universities are advised to maximize the benefit of cloud computing. This will go a long way in enhancing service quality.
- 4.In the evolving world, the importance of digital literacy competency cannot be overemphasized, hence personnels in academic libraries in the federal universities should endeavor to stay updated.

#### **5.4 Contribution to Knowledge**

This study offers significant contribution to literature conceptually, theoretically and empirically.

Conceptually, scholars pointed out that Service quality is an evaluation of how well a service lives up to the customer's expectations. Scholars averred that academic library services revolve around the gathering, organization, preservation, interpretation, and dissemination of information to support their clients in their quest to create more knowledge. To achieve this, libraries offer services such as reference services (both online and offline), circulation services, research advisory services, bibliographic completion, indexing and abstracting services, information retrieval services, and a host

of other services targeted at ensuring that the information needs of their clients are met adequately.

From the theoretical stand point the Innovation Diffusion Theory was strengthened. The theory was developed to explain how individuals and groups come to accept new innovations being introduced to them. The theory categorizes innovation adoption based on how quickly (or slow) the target users eventually accept innovations. It also seeks to explain the stages an innovation has to go through before it is finally adopted by the target users. This study results are in concomitance with these theoretical perspectives.

Empirically, the study is able to add to recent literature on the interaction among Cloud computing, digital literacy competency and service quality. Though, studies on Cloud computing, digital literacy competency and service quality abound in developed economy context, however, empirical study from developing countries like Nigeria seems to be few in this regard. By the findings of the four null hypotheses examined, the study becomes a basis for reference for future study on Cloud computing, digital literacy competency and service quality. Moreover, the study provides findings which scholars can use to buttress the empirical submissions in their study.

Overall, these above-mentioned points lay emphasis on the fact that this study offers significant contribution to knowledge and has practical implication for the management and personnel of Federal universities in Southwest Nigeria that were investigated.

## **5.5 Suggestion for Further Research**

In view of the limitations given above, the researcher makes the following suggestions for future research:

1. This study was carried out in six federal universities, Southwest Nigeria, further studies in the area of Cloud computing, digital literacy competency and service quality can as well be carried out in other tertiary institutions so as to be able to extend the knowledge gained from this work to all tertiary institutions in the country.
2. This study investigated Cloud computing, digital literacy competency and service quality of Library personnel in Federal Universities, Southwest Nigeria, a comparative study with Private and State Universities in Nigeria may be considered in the nearest future.
3. The inclusion of larger sample size is necessary to give room for more generalization and conclusion.
4. This study focused on Federal Universities; however, further studies can consider the State Universities in Southwest Nigeria.

## Bibliography

### Books

- Sarkar, P. *Data as a Service: A Framework for Providing Reusable Enterprise Data Services*. John Wiley & Sons. 2015.
- Vuorikari, R., Punie, Y., Carretero Gomez S., Van Den Brande, G. *Digcomp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: The Conceptual Reference Model*. Luxembourg Publication. Office of the European Union. Eur 27948 2016. En. Doi:10.2791/11517
- Wong, M. A., & Saunders, L. (Eds.). *Reference and Information Services: An Introduction*. ABC-Clio. 2020.

### Conference Proceedings

- Bhoi, N. K. *Use of Information Communication Technology (Ict) And Library Operation: An Overview*. Proceedings Of an International Conference on Future Libraries: From Promises to Practices 2017. Retrieved From [Lite//Www.Researchgate.Net](http://www.researchgate.net)
- Gill, S. S., Arya, R. C., Wander, G. S., & Buyya, R. *Fog-Based Smart Healthcare as a Big Data and Cloud Service for Heart Patients Using Iot*. In International Conference on Intelligent Data Communication Technologies and Internet of Things (ICICI) Springer International Publishing. 2018 Pp. 1376-1383).
- Kiv, A., Semerikov, S., Soloviev, V., & Striuk, A. *Computer Science & Software Engineering*. Ceur Workshop Proceedings 2019. ([Http://Ceur-Ws. Org/](http://ceur-ws.org/)).
- Srivastava, J. P., & Verma. V. K., *Cloud Computing in Libraries: Its Needs, Applications, Issues and Best Practices*, 4th International Symposium on Emerging Trends and Technologies in Libraries and Information Services, ETTLIS 2015 Proceedings, 2015, 33-38

### Internet sources

- Abram S, "35 Powerful Cloud Tools for Modern Librarians - Stephen's Lighthouse," *Stephen's Lighthouse - Stephen Abram's Posts About Library Land* (Stephen's Lighthouse, October 30, 2018), [Https://Stephenslighthouse.Com/2018/11/02/35-Powerful-Cloud-Tools-For-Modern-Librarians-2/](https://stephenslighthouse.com/2018/11/02/35-powerful-cloud-tools-for-modern-librarians-2/).
- Appleton, L. Training and Development for Librarians. Why Bother? Retrieved From [Www.Elsevier.Com>Library-Connect](http://www.elsevier.com/library-connect). 2018 Arl Statistics *What is ARL Statistics?* (2022). Available At: [Https://Www.Arlstatistics.Org/Home](https://www.arlstatistics.org/home). Accessed On November 13, 2022
- Diffusion of Innovations Theory Definition.*" Investopedia. Accessed April 2, 2022. [Https://Www.Investopedia.Com/Terms/D/Diffusion-Of-Innovations-Theory.Asp](https://www.investopedia.com/terms/d/diffusion-of-innovations-theory.asp)

OCLC. OCLC Worldshare Management Services.2012.  
[Http://Www.Oclc.Org/Worldshare-Management-Services.En.Html](http://www.oclc.org/worldshare-management-services.en.html)

Kiran K, *Service quality and customer satisfaction in academic libraries: Perspectives from a Malaysian university*. **Library Review**, 59, 2010, 261-273. <https://doi.org/10.1108/00242531011038578>.

### Journal Articles

Abba, T. & Babayi, B. U. *Website Use and Evaluation by Senior Library Staff in Ibrahim Babangida Library, Modibbo Adama University of Technology, Yola, Nigeria*. **Information Technologist** 16.1: 2019. 95-105.

Abban, S. *Training and Development of Library Staff: A Case of Two University Libraries in Ghana*. **Library Philosophy and Practice**. 2018. Retrieved from [https://Digitalcommons.Unl.Edu/Libphilprac/1794](https://digitalcommons.unl.edu/libphilprac/1794).

Abdoh, E.S., *Library Anxiety Among Omani and Saudi Arabian International Students: A Case Study at The University Of South Carolina, USA*. **The Journal of Academic Librarianship**, 47(2), 2021.P.102305.

Abdullahi, Z. M. & Haruna, I. *Utilisation Of Information and Communication Technology (Ict) For Information Service Delivery in University Libraries in Adamawa State*. **The Information Scientist** 5.2: 2008. 24-30.

Abubakar, A. & Attahir, I. S. *Innovative and Creative Skills for the 21st Century Librarian: Benefits and Challenges in Nigerian Academic Libraries*. **Journal of Information and Knowledge Management** 9.2: 2018. 113 – 120.

Adeleke, A. A. & Olorunsola, R. *ICT And Library Operations: More on The Online Cataloguing and Classification Tools and Techniques in Nigerian Libraries*. **The Electronic Library** 28.3: 2010. 453 – 462.

Aderibigbe, N. & Chiemenem, C. M. *Cultural Attitudes of Library Personnel and Their Readiness for the Global Library Work Environment*. **Library Philosophy and Practice**. 2019. Retrieved, From [https://Digitalcommons.Unl.Edu/Libphilprac/2776](https://digitalcommons.unl.edu/libphilprac/2776).

Ahenkorah-Marfo, M. & Akussah, H. *Information on the Go: Perspective of Academic Librarians on Use of Social Media In Reference Services*. **International Information and Library Review** 49.2: 2017. 87-96.,

Ahmad, K., JianMing, Z., & Rafi, M. *An Analysis of Academic Librarians Competencies and Skills for Implementation of Big Data Analytics in Libraries: A Correlational Study*. **Data Technologies and Applications**, 53(2), (2019). 201-216.

Ahmed, A. M., & Allawi, O. W. *A Review Study on The Adoption of Cloud Computing for Higher Education in Kurdistan Region-Iraq*. **Uhd Journal of Science and Technology**, 4(1), 2020. 59-70.

Ahmed, S., & Rasheed, T. *Relationship Between Personality Traits and Digital Literacy Skills: A Study of University Librarians*. **Digital Library Perspectives**, 36(2), (2020). 191-206.

- Ahmed, S., & Sheikh, A. *Information and Communication Technology Skills Among Library and Information Science Professionals: A Predictor of Enhanced Library Services*. **Journal of Librarianship and Information Science**, 53(3), 2021. 444-453.
- Aiyebilehin, A. J., Makinde, B., Odiachi, R., & Mbakwe, C. C. *Awareness and Use of Cloud Computing Services and Technologies by Librarians in Selected Universities in Edo State*. **International Journal of Knowledge Content Development & Technology**, 10(3), 2020. 7-20.
- Ajie, I. *Information Service Provision by Librarians in The Era of Globalisation*. **Library Philosophy and Practice**. 2019. Retrieved April 3, 2020, From <https://digitalcommons.unl.edu/libphilprac/2517>.
- Ajie, I. *Professional Branding of an Information Professional through ICT For Effective Service Delivery*. **Library Philosophy and Practice**. 2019. Retrieved from <https://digitalcommons.unl.edu/libphilprac/2515>.
- Akintola, B. O., Adetomiwa, B., & Onifade, F. N. *Staff Training and Career Development among Library Staff in Federal Universities in Southwest, Nigeria*. **International Information & Library Review**, 54(4), 2022. 315-324.
- Akintola, B.O., *Capacity Building, ICT Skills, Use and Service Delivery of Library Personnel in Universities in Southwestern Nigeria (Doctoral Dissertation)*. 2021.
- Aktar, S., & Habiba, U. *Evaluating User Information Need and Satisfaction Level at Selected Academic Libraries in Bangladesh*. **Bangladesh Journal of Library and Information Science**, 2021, 185.
- Alabi, S.O., *Use of Electronic Resources by Undergraduates in Selected Private University Libraries in South West Nigeria*. **African Journal of Library, Archives & Information Science**, 31(1). 2021.
- Aliyu, A. & Shuaib, S. *Assessment of Staff Training and Development Programmes in Isa Kaita Library, Kaduna Polytechnic, Kaduna, Nigeria*. **Ebonyi Journal of Library and Information Science** 2.1: 2016. 203-210.
- Alqarni, T., & Barnawi, A. *A Cloud Adoption Framework : Assessing The Factors And Determinants Of Adoption Cloud Computing Technology*. **Multi-Knowledge Electronic Comprehensive Journal for Education and Science Publications**, 26, 2019. 1–30.
- Amron, M. T., Ibrahim, R., Azaliah, N., Bakar, A., & Chuprat, S. *Determining Factors Influencing the Acceptance of Cloud Computing Implementation Determining Factors Influencing Acceptance of a Cloud Computing Implementation*. **Procedia Computer Science**, 161, 2019, 1055–1063. <https://doi.org/10.1016/j.procs.2019.11.216>
- Ani, O. E., Atseye, E. U. & Esin, J. E. *Issues and Challenges of Globalisation of Library Services in Nigeria in the 21st Century*. **Information Development** 21.3: 2005. 193-201.

- Antidius, F. *Usage of Information and Communication Technology to Support Innovative Library Services in Universities: A Case of The University of Dar Es Salaam Wilbert Chagula Library*. **University Of Dar Es Salaam Library Journal** 13.2: 2018. 3-17.
- Anunobi, C. V. *Human Capacity Building in Nigerian University Libraries: An Imperative for Academic Libraries' Contribution Towards National Development*. **African Journal of Library, Archives and Information Science** 23.1: 2013. 33-44.
- Anyim, W. O. *E-Library Resources and Services: Improvement and Innovation of Access and Retrieval for Effective Research Activities in University E-Libraries in Kogi State Nigeria*. **Library Philosophy and Practice**, 2018. 0\_1-21. E
- Arokyamary, R. J., Ramasesh, C. P. & Swamy, D. *ICT Skills and Core Competences of LIS Professionals: A Study*. **Library and Information Services for All**. 338. 2017. Retrieved From E Prints. Uni:-Mysore.Ac.In/18296/1/19pdf.
- Ashcroft, L. & Watts, C. *ICT Skills For Information Professionals in Developing Countries: Perspective from A Study of The Electronic Information Environment in Nigeria*. **International Federation of Library Associations and Institutions Journal** 3.1(1): 2005.6 – 12.)
- Ashiq, M. *Measuring Library Service Quality of The College Libraries in Pakistan: An Analysis of the Libqual Comments*. **Library Philosophy and Practice**, 2020. 1-24.
- Ashiru, B. B., Muritala, A., Awujoola, O. A., & Bayowa, O. O. *Electronic Information Resources Use, Quality Reference Service Delivery and Academic Performance of Final Year Students in Colleges of Education in Lagos State, Nigeria*. **Library Philosophy & Practice**, 2022.
- Atanda, A. D., Owolabi, K. A., & Ugbala, C. P. *Professional Competence and Attitudes Of Library Personnel Towards Digital Services In Selected University Libraries In Nigeria*. **Digital Library Perspectives**, 37(3), (2021). 209-222.
- Awa, P.C., Aloysius, D.A. & Okereke, J.N., *Platform As AaService (Paas) And Information Service Delivery in Federal University Libraries in South-South and South-East, Nigeria*. **Lagos Journal of Library and Information Science**, 10(1-2), 2022. Pp.242-254.
- Ayoku, O. A., & Okafor, V. N. *ICT Skills Acquisition and Competencies of Librarians: Implications for Digital and Electronic Environment in Nigerian Universities Libraries*. **The Electronic Library**, 33(3), 2015.502-523.
- Babalola, Y.T. & Haliso, Y. *Library and Information Services to The Visually Impaired: The Role of Academic Libraries*. **Canadian Social Science** 7.1: 2011. 140-147.
- Bailey, J., & Faulkner, K. *Usage And User Experience in An Academic Law Library*. **Legal Information Management**, 18(2), 2018,103-109.
- Bano, S., Mehraj, M. & Rehman, I. *Librarians and Their Distinctive Personality Traits in the 21st Century Digital Era*. **Library Philosophy and Practice**. 2019. Retrieved from <https://Digitalcommons.Unl.Edu/Libphilprac/2604>.

- Baro, E. E. Obaro, O.G.& Aduba, E. D. *an Assessment of Digital Literacy Skills and Knowledge-Based Competencies Among Library Personnel Working in University Libraries in Africa*, **Digital Library Perspectives** 35, No. 3–4, 2019: 172–192.
- Bhanu, P., & Manoj Kumar, J. *Assessing Library Service Quality at Baba Farid University of Health Sciences (Bfuhs), Faridkot: A Libqual+Tm Study*. **Journal Of Knowledge & Communication Management**, 7(1), 49–64. <https://doi.org/10.5958/2277-7946.2017.00005.5>
- Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. *Technological Disruptions in Services: Lessons from Tourism and Hospitality*. **Journal of Service Management**. 2019.
- Cephas, O., Wanyonyi, M. S., & Sikolia, G. S. *Effect Of Library Services on The User Satisfaction at Pwani University Library*. **The Strategic Journal of Business & Change Management**. Vol. 5, (3), 2018.Pp 935 - 951,
- Chewe, P. *Enhanced Library Services Through Social Media In The Age Of Covid-19 Pandemic: An Anecdote Of Academic Libraries In Zambia*. **Library Philosophy and Practice**, 2020. 0\_1-13.
- Cirus, L. & Simonova, I. *Pupils' Digital Literacy Reflected in Teachers' Attitudes Towards Ict: Case Study of The Czech Republic*. **Computer Science**, 2(3), 2021. 1-11.
- Cox, A. M., Pinfield, S., & Rutter, S. *The Intelligent Library: Thought Leaders' Views on The Likely Impact Of Artificial Intelligence On Academic Libraries*. **Library Hi Tech**, 37(3), 2019. 418-435.
- Cox, J., *Positioning the Academic Library Within the Institution: A Literature Review*. **New Review of Academic Librarianship**, 24(3-4), 2018. Pp.217-241.
- Cristobal, A.S., *Expectations on Library Services, Library Quality (Libqual) Dimension and Library Customer Satisfaction: Relationship to Customer Loyalty*. **Library Philosophy and Practice (E-Journal)**, 1706, 2018. Pp.1-24.
- Dabengwa, I. M., Raju, J., & Matingwina, T. *Academic librarian's transition to blended librarianship: a phenomenology of selected academic librarians in Zimbabwe*. **The Journal of Academic Librarianship**, 45(4), 2019. 343-357.
- David-West, O., Iheanachor, N., & Umukoro, I. *Sustainable Business Models for The Creation of Mobile Financial Services in Nigeria*. **Journal of Innovation & Knowledge**, 5(2), 2020. 105-116.
- Echem, M. E. *Information Retrieval Tools and Library Physical Environment as Correlates of Library Utilization by Students in Rivers State University Library, Nigeria*. **Library Philosophy and Practice**, 2018. 1.
- Edewor, N. *Capacity Building Efforts to Develop Digital Innovation Competencies Among Library Personnel in Nigeria*, **Journal Of Library Administration** 60, No. 3 2020: 316–330, <https://doi.org/10.1080/01930826.2020.1727281>.
- Efosa, E. F., Sheji, R. M & Efosa-Isibor, O. S. *Information and Communication technologies For Service Delivery In Babs Fafunwa Library, Adeyemi College Of*

*Education, Ondo, Nigeria. Ebonyi Journal of Library and Information Science* 2.1: 2015. 101-108.

Ezeibe, R., Udo-Okon, T. N., & Okwuwe, E. *Skill Needs of Library Personnel for Effective Cataloguing and Classification Services in University Libraries in Akwa Ibom State, Nigeria. International Journal of Library and Information Science Studies*, 7(3), 2021. 55-64.

Fagan, J. C., *The Dimensions of Library Service Quality: A Confirmatory Factor Analysis of the Libqual+ Instrument, Library and Information Science Research*, 36(1), 2014, 36–48.

Fagbola, O. O. Smart, A. E. & Oluwaseun, B. O. *Application of Cloud Computing Technologies in Academic Library Management, Research Anthology on Collaboration, Digital Services, And Resource Management for the Sustainability of Libraries*, 2021: 704–728;

Fai, L. K., Siew, L. W., & Hoe, L. W. *Analysis on the Library Service Quality with Analytic Hierarchy Process Model. In Journal of Physics: Conference Series. Iop Publishing*. Vol. 1706, No. 1, 2020, P. 012154

Farooq, M. U., Ullah, A., Iqbal, M. & Hussain, A. *Current And Required Competencies of University Librarians in Pakistan. Library Management* 37. 8&9: 2016. 410-425.

Federer, L. *Defining Data Librarianship: A Survey of Competencies, Skills and Training. Journal of Medical Library Association* 106.3: 2018. 294-303.

Gandotra, N., Tyagi, N., & Tiwari, S. *Application of Cloud Computing Technology in Libraries. Journal of Advancements in Library Sciences*, 6(2), (2019). 16-23.

Grover, P. Kar, A.K. Janssen, M. & Ilavarasan, P.V. *Perceived Usefulness, Ease of Use and User Acceptance of Blockchain Technology for Digital Transactions—Insights from User-Generated Content on Twitter. Enterprise Information Systems*, 13(6), 2019. Pp.771-800.

Guchacha, J., *Integration of Cloud Computing and Service Delivery in Academic Libraries with Reference to South Eastern Kenya University, Doctoral Dissertation, University of Nairobi*. 2019.

Gul, S. & Bano, S., *Smart Libraries: An Emerging and Innovative Technological Habitat Of 21st Century. The Electronic Library*. 2019.

Haq, I. U. *Patterns of Library and Information Science Research in Pakistan during 2020. Library Philosophy and Practice (e-journal)*, 6529, 2021. 1-28.

Hart, S., & Amos, H. *The Library Assessment Capability Maturity Model: A Means of Optimizing How Libraries Measure Effectiveness. Evidence Based Library and Information Practice*, 13(4), (2018). 31-49.

Hassan, M. U. Iqbal, A. & Iqbal, Z. *Factors Affecting the Adoption of Internet Banking in Pakistan: An Integration of Technology Acceptance Model and Theory of Planned Behaviour. International Journal of Business Information Systems*, 28(3), 2018. Pp.342-370.

- Herman, M., Herman, M., Iorga, M., Salim, A. M., Jackson, R. H., Hurst, M. R., ... & Sardinas, R. *NIIST Cloud Computing Forensic Science Challenges*. US Department of Commerce, National Institute of Standards and Technology. 2020.
- Hoover, J. *Gaps in It and Library Services at Small Academic Libraries in Canada*. **Information Technology and Libraries**. 2018. Pp 15-26 Retrieved from <https://doi.org/10.6017/ital.v37i4.10596>.)
- Iatsyshyn, A. V., Kovach, V. O., Romanenko, Y. O., & Iatsyshyn, A. V. *Cloud Services Application Ways for Preparation of Future Phd. in Cite Workshop Proceedings* Vol. 6, 2019, Pp. 197-216.
- Idhalama, Ogagaoghene U. & Fidelis, Antidius, "Perception and Attitude of Librarians Towards Cloud Computing in The University of Dar Es Salaam Library" **Library Philosophy and Practice (E-Journal)**. 4023. 2020. <https://digitalcommons.unl.edu/libphilprac/4023>
- Idiegbeyan-Ose, J., Nkiko, C. & Ifeakachuku, O. *Value Added Service to Academic Library Users In 21st Century: Using Competitive Intelligence Approach*. **Library Philosophy and Practice**. 2017. Retrieved from <http://digitalcommons.unl.edu/libphilprac/1570>.
- Idiegbeyan-Ose, J., Nkiko, C., Idahosa, M. & Nwokeoma, N. *Digital Divide: Issues and Strategies for Intervention in Nigerian Libraries*. **Journal of Cases on Information Technology** 18: 2016. 29-39.
- Igbo, H. U. & Imo, N. T. *Electronic Information Resource Sharing Among University Libraries in Southern Nigeria: Opportunities and Challenges*. **African Journal of Library Archival and Information Science** 27.1: 2017.77-91.
- Ip, R. K. F., & Wagner, C. *Libqual+® As A Predictor of Library Success: Extracting New Meaning Through Structured Equation Modeling*. **The Journal of Academic Librarianship**, 46(2), 2020. 102102.
- Iyal, U. *Evaluation of Librarians Acceptability Levels and Use of Cloud Computing for Library Services in Tertiary Institutions of Kaduna State, Nigeria*. In Theses. 2018,
- James, N., Shamchuk, L. & Koch, K. *Changing Roles of Librarians and Library Technicians*. **The Canadian Journal of Library and Information Practice and Research** 10.2: 2015. 1-29.
- Jamogha, O., Jamogha, E., & Godwin, L. S. *Influence of ICT Skills On Library Information Resources Utilisation by Undergraduates in Two Universities in South-West, Nigeria*. **Information Impact: Journal Of Information and Knowledge Management**, 10(2), 2019. 67-80.
- Jauhiainen, I., & Hintikka, K. *An International Comparison of Libqual+ Results Based on The Information Literacy and Liber Questions*. **Qualitative And Quantitative Methods on Libraries**, 7(3), 2018. 545-553.
- Joel A. P. & Ibrahim, F. L. *Digital Competencies Needed by Library Personnel and Information Professionals for Knowledge Management of 21st century University Libraries In Borno State*, **Library Philosophy And Practice** 2021.

- Kang, Q. *Library directors' concerns and attitudes towards going green and sustainability in China: An unexplored area*. **Journal of Librarianship and Information Science**, 52(2), 2020. 382-398.
- Kao, H.K. Tsai, S.N. Chang, W.L. & J. H. Chang, *Factors Affecting Vlog Viewers' Behavioral Intentions: An Empirical Study Based on Innovation Diffusion Theory*. In 2021 International Conference on Technologies and Applications of Artificial Intelligence (TaaI) 2021, Pp. 168-173.
- Kayode, A. I., Tella, A., & Akande, S. O. *Ease-Of-Use and User-Friendliness of Cloud Computing Adoption or Web-Based Services in Academic Libraries in Kwara State, Nigeria*. **Internet Reference Services Quarterly**, 23(3-4), 2020. 89-117.
- Khaola, P., & Mabilikoane, M. *Perception of Library Service Quality, Satisfaction and Frequency of Use of Library Resources*. **Inkanyiso: Journal of Humanities and Social Sciences**, 7(1), 2015, 44-52.
- Khaola, P., *Perception of Library Service Quality, Satisfaction and Frequency of Use of Library Resources*, **Inkanyiso: Journal of Humanities and Social Sciences**, 7(1), 2015, 44-52-62.
- Khayer, A., Talukder, M. S., Bao, Y., & Hossain, M. N. *Cloud Computing Adoption and Its Impact on SMEs' Performance for Cloud Supported Operations: A Dual-Stage Analytical Approach*. **Technology In Society**, 60, 2020. 101225.
- Kiprop, E. Matsui, K. & Maundu, N., *The Role of Household Consumers in Adopting Renewable Energy Technologies in Kenya*. **Environments**, 6(8), 2019. P.95.
- Kiriri, P.N., *Reliability and Validity of a Libqual Scale: A Case of a Private University in Kenya*. **DbA Africa Management Review**, 9(1). 2019.
- Kumar, A., & Mahajan, P. *Evaluating Library Service Quality of University of Kashmir: A Libqual+ Survey*. **Performance Measurement and Metrics**. 2019.
- Kumar, A., & Mahajan. P., *Library Performance Assessment of Service Quality through Libqual: The Case of Maharshi Dayanand University (Mdu), Rohtak (India)*, **Library Philosophy and Practice**, 2019.
- Kumar, B.A. & Mohite, P. *Usability of Mobile Learning Applications: A Systematic Literature Review*. **Journal Of Computers in Education**, 5(1), 2018. Pp.1-17.
- Kumar, P. R., Raj, P. H., & Jelciana, P. *Exploring Data Security Issues and Solutions in Cloud Computing*. **Procedia Computer Science**, 125, 2018. pp.691-697.
- Kwaghga, B., Anthony, I. A., & Helen, T. A. F. *Information retrieval skills and the use of electronic resources in university libraries by undergraduate Students in Benue State University*. **Library Philosophy and Practice (e-journal)**. 2019.
- Ledwaba, L. S., Jiyane, G. V., & Mugwisi, T. *Examining the Extent of Internet Access in Public Libraries in South Africa*. **Mousaion**, 38(2). 2020.
- Li, S., Jiao, F., Zhang, Y., & Xu, X. *Problems and Changes in Digital Libraries in the Age of Big Data from The Perspective of User Services*. **The Journal of Academic Librarianship**, 45(1), 2019. 22-30.

- Linden, J., Tudesco, S. & Dollar, D., *Collections as a Service: A Research Library's Perspective*. **College & Research Libraries**, 79(1), 2018. P.86.
- Liu, Y., Wang, P., Thomas, M. L., Zheng, D., & Mckirdy, S. J. *Cost-Effective Surveillance of Invasive Species Using Info-Gap Theory*. **Scientific Reports**, 11(1), 2021. 1-7.
- Madhuri, A.J., *Use and Awareness of Reference Management Software Tools by Research Scholars of Library and Information Science in India: A Study*. **Library Philosophy and Practice (E-Journal)**. 6371. 2021. <https://Digitalcommons.Unl.Edu/Libphilprac/6371>
- Madu, E. C., Idoko, A. N., Dirisu, M. B. And Emerole, N. *Institutional Readiness and Application of Web 2.0 For Information Service Provision in University Libraries in Nigeria*. **Information And Knowledge Management** 7.8: 2017. 19-25.
- Mahanta, P.K., *Usage of Information and Communication Technology in The Degree College Libraries of Assam: A Study*. **Library Philosophy and Practice (Ejournal)**, 3829, 2020. Pp.1-13.
- Markova, O., Semerikov, S., Striuk, A., Shalatska, H., Nechypurenko, P., & Tron, V. *Implementation of Cloud Service Models in Training of Future Information Technology Specialists*. Proceedings of the 6th Workshop on Cloud Technologies in Education Cite 2018, Kryvyi Rih, Ukraine, December 21, 2018, 2019.
- Martínez-Bravo, M. C., Sádaba Chalezquer, C., & Serrano-Puche, J. *Dimensions of Digital Literacy In The 21st Century Competency Frameworks*. **Sustainability**, 14(3), (2022). 1867.
- Martzoukou, K., & Elliott, J. *The Development Of Digital Literacy And Inclusion Skills Of Public Librarians*. **Communications in Information Literacy**, 10(1), 5. 2016.
- Mattar, J., Ramos, D. K., & Lucas, M. R. *Digcomp-Based Digital Competence Assessment Tools: Literature Review and Instrument Analysis*. **Education And Information Technologies**, 27(8), 2022. 10843-10867.
- Mckay, D., Chang, S., Smith, W., & Buchanan, G. *The Things We Talk About When We Talk About Browsing: An Empirical Typology of Library Browsing Behavior*. **Journal Of the Association for Information Science and Technology**, 70(12), 2019. 1383–1394.
- Medberg, G. & Grönroos, C., *Value-In-Use and Service Quality: Do Customers See a Difference?* **Journal Of Service Theory and Practice**, 30(4/5), 2020. Pp.507-529.
- Mishra, A., Alzoubi, Y.I., Gill, A.Q. & Anwar, M.J., *Cybersecurity Enterprises Policies: A Comparative Study*. **Sensors**, 22(2), 2022. P.538.
- Mishra, C., Manglam, A. K., & Moita, P. *Pivotal Role of the Library in Higher Education Reforms: A Critical Look*. In *Handbook of Research on Knowledge and Organization Systems in Library and Information Science*. **IGI Global**. 2021. pp. 251-269
- Momodu. O. M., *Academic Library in Nigeria: Yesterday, Today and Tomorrow*, **American Journal of Social Sciences**, 3(4), 2015, 115–119. <http://Www.Openscienceonline.Com/Journal/Ajss>.

- Nicholson, J., & Tokoro, S. *Cloud Hopping: One Library's Experience Migrating from One LSP to Another*. **Technical Services Quarterly**, 38(4), 2021, 377-394.
- Nnadozie, C.O. *Library Use as Correlate of User-Satisfaction Amongst Lecturers in University Libraries in South-East Zone of Nigeria*. **Research Journal of Library and Information Science**, 1(2), 2017.31 – 41
- Ntui, A. I., & Enang, U. *Socio-Demographic Variables and Utilization of ICT Among Members of Staff of University Libraries in Cross-River and Akwa-Ibom State Nigeria*. **Global Journal of Educational Research**, 21(2), 2022. 159-171.
- Ntui, A. I., Robert, B. E. & Usang, E. I. *Economic Challenges and Prospects Associated with The Utilisation of Information and Communication Technology (Ict) For Library Services in Universities In Cross River State, Nigeria*. **Computing And Information Systems**. 21.1: 2017.29-39.
- Obotu, A. S. Chukwuka, O. O. & Gambo, S. B. *The Need for The Use of Information and Communication Technology in Two University Libraries in Nigeria*. **Library Philosophy And Practice** 2019.. Retrieved From [Ttps://Digitalcommons.Unl.Edu/Libphilprac/2665](https://Digitalcommons.Unl.Edu/Libphilprac/2665).
- Oguche D., Lamidi, D. A. & Gabasa, P. *Capacity Building for Library and Information Professionals: Core Skills and Competence*. **International Journal of Applied Technologies in Library and Information Management** 3.2: 2017. 1-5.
- Okeji, C. C., Tralagba, E. C., & Obi, I. C. *An Investigation of the Digital Literacy Skills and Knowledge-Based Competencies Among Librarians Working in University Libraries in Nigeria*. **Global Knowledge, Memory and Communication**, 69(4/5), (2020). 311-330.
- Okolocha, C. C., & Ezike, N. N. *Extent of information and communication technology skills possessed by office technology and management graduate workers in the civil service of Enugu State*. **NAU Journal of Technology and Vocational Education**, 3(1), 2019.11-23.
- Olubiyo, P. O., & Awoyemi. R. A. *Automation of Academic Libraries in Nigeria: Issues and Practices*, **Library Philosophy and Practice**, 2021, 1–17.
- Omehia, A., Okwu, E., & Nsirim. O., *Library Personnel' ICT Competencies and Utilization of Emerging Technologies in Academic Libraries in Rivers State, Nigeria Media Misinformation and Information Management in the Era of New Technologies View Project*, **Library Philosophy And Practice** <https://Digitalcommons.Unl.Edu/Libphilprac>.
- Omelizor, S. U., Pelemo, G. D., Agbawe, M. O., Onasote, A. O. & Imam, A. *Library Infrastructure as Predictor of Turnover Intentions of Librarians in University Libraries in Nigeria*. **Journal of Information and Knowledge Management** 8.1: 2017. 1-12.
- Omorodion, O. *Library as A Change Agent: Examining the Roles of Library in Private Higher Institutions in South West Nigeria*. **Library Philosophy and Practice**. 2018. Retrieved from [Https://Digitalcommons.Unl.Edu/Libphilprac/2006](https://Digitalcommons.Unl.Edu/Libphilprac/2006).

- Osborne, S.P., *From Public Service-Dominant Logic To Public Service Logic: Are Public Service Organizations Capable of Co-Production And Value Co-Creation?* **Public Management Review**, 20(2), 2018. Pp.225-231.
- Owusu, A., *Determinants of Cloud Business Intelligence Adoption among Ghanaian SMEs.* **International Journal of Cloud Applications and Computing (IJCAC)**, 10(4), 2020. Pp.48-69.
- Oyedokun, T. T., Oyewumi, F. A., Akanbi, M, Lawal, P. & Laaro, D. M. *Assessment of Ict Competencies of Library Staff in Selected Universities in Kwara State, Nigeria.* **Library Philosophy and Practice**. 2018. Retrieved from <https://Digitalcommons.Unl.Edu/Libphilprac/1797>.
- Oyovwe-Tinuoye, G. O., Omeluzor, S. U., & Patrick, I. O. *Influence of ICT skills on job performance of librarians in university libraries of South-South, Nigeria.* **Information Development**, 37(3), 2021. 345-358.
- Oyovwe-Tinuoye, G.O., *Users Perception of Services, Resources and Facilities in Federal University of Petroleum Resources Effurun (Fupre) Library.* **Library Philosophy and Practice**, 2020. Pp.1-20.
- Pangrazio, L., Godhe, A.L. & Ledesma, A.G.L., *What Is Digital Literacy? A Comparative Review of Publications Across Three Language Contexts.* **E-Learning and Digital Media**, 17(6), 2020. Pp.442-459.
- Pathak, H. S., Brown, P., & Best, T. *A Systematic Literature Review of the Factors Affecting the Precision Agriculture Adoption Process.* **Precision Agriculture**, 20, 2019, 1292-1316.
- Pekkaya, M., Pulat İmamoğlu, Ö., & Koca, H. *Evaluation of Healthcare Service Quality Via Servqual Scale: An Application on A Hospital.* **International Journal of Healthcare Management**, 12(4), 2019. 340-347.
- Putteeraj, M. Bhungee, N. Somanah, J. & Moty, N. *Assessing E-Health Adoption Readiness Using Diffusion of Innovation Theory and The Role Mediated by Each Adopter's Category in A Mauritian Context.* **International Health**, 2021.
- Ramezani. A., *A Meta-Analysis of Service Quality of Iranian University Libraries Based on the Libqual Model,* **Performance Measurement and Metrics**, 19(3), 2018, 186–202.
- Raza, S. A., Umer, A., Qureshi, M. A., & Dahri, A. S. *Internet Banking Service Quality, E-Customer Satisfaction and Loyalty: The Modified E-Servqual Model.* **The TQM Journal**. 2020.
- Reisoğlu İ. & Çebi, A. *How Can The Digital Competences of Pre-Service Teachers Be Developed? Examining A Case Study Through the Lens of Digcomp and Digcompedu,* **Computers And Education** 156, 2020.
- Rizky, T. D., Huda, N., Muslikh, M., & Rini, N. *Analysis (Libqual) on Loyalty and Library Satisfaction; A Case Study in Yarsi University Library Service Center.* **Journal Organisasi Dan Manajemen**, 16(2), 2020. 182-195.

- Roberts, J. *Future and Changing Roles of Staff in Distance Education: A Study to Identify Training and Professional Development Needs*. **Distance Education**. 39: 2018. 37-53.
- Robertson, S. *Exploring the Efficacy of Training and Development for Liaison Librarians at Deakin University, Australia*. **Journal of Higher Education Policy and Management**.40.2: 2018.107–120.
- Saib, M. O., Rajkoomar, M., Naicker, N., & Olugbara, C. T. *Digital pedagogies for librarians in higher education: a systematic review of the literature*. **Information Discovery and Delivery**, 2022.
- Salam, N. A & Ali. S., *Determining Factors of Cloud Computing Adoption: A Study of Indonesian Local Government Employees*, **Journal of Accounting and Investment**, 21(2), 2020.
- Sani, O. J. & Musa, A. *Influence of ICT Competencies on Job Performance Among Library Personnel in Tertiary Institution in Lokoja, Kogi State, Nigeria*. **Samaru Journal of Information Studies** 19.1: 2019. 62-76.
- Shaheen, S., & Cohen, A. *Shared Ride Services in North America: Definitions, Impacts, and The Future of Pooling*. **Transport Reviews**, 39(4), 2019. 427-442.
- Sharma, M., Gupta, R., & Acharya. P., *Analysing the Adoption of Cloud Computing Service: A Systematic Literature Review*, **Global Knowledge, Memory and Communication**, 70(1–2), 2021, 114–153.
- Shidi, H. & Ape, R. *Information and Communication Technology Facilities and Skills Level of Library Staff of Universities in Benue State*. **Information Technologist** 8:2: 2011. 85-92.
- Sivankalai, S. "The Impact of Cloud Computing on Academic Libraries." **Library Philosophy and Practice (E-Journal)** 9, No. 3 2021: 1-17.
- Sivesan, S., *Factor Analysis of Perceived Service Quality of Hospitality Industry in Jaffna District: An Application of SERVQUAL Model*. **Global Journal of Management and Business Research: G Interdisciplinary**, 20 (4): 2020.36, 43.
- Soltani-Nejad, N., Vakilimofrad, H., Fazli, F., Saberi, M. K., Douhani, A., & Mazloun, J. *Developing A Model to Identify the Factors Contributing to User Loyalty of University Libraries*. **The Journal of Academic Librarianship**, 47(5), 2021. 102386.
- Sultan, M. & Rafiq, M. *Open Access Information Resources and University Libraries: Analysis of Perceived Awareness, Challenges, And Opportunities*. **The Journal of Academic Librarianship**, 47(4), 2021. P.102367.
- Swaminathan, S. & Karthikeyan, G. *A Study on Level of Awareness of Computer and Collaborative Tools Among Lis Professionals*. **Current Trends in Library and Information Science**. 1 & 2 2016. Retrieved From [Www.Jctl.Org/Index.Php/Jctl/Article/View/1/](http://www.jctl.org/index.php/jctl/article/view/1/).

- Taylor, M., Pratt, M. E., & Fabes, R. A. *Public Libraries as A Context for The Study of Learning and Development*. **Journal Of Higher Education Outreach and Engagement**, 23(2), 2019. 51-62.
- Tella, A. & Sidiq, A. O. *Loan and Cooperation Among Selected Academic Libraries in Kwara State, Nigeria: An Empirical Analysis*. **Journal of Interlibrary Loan, Document Delivery & Electronic Reserves**. 26.2: 2017.103-120.
- Tella, A., & Oladeji. T. I., *Empirical Investigation on Impact of Koha on Library Services in Selected Academic Libraries in Nigeria*, **Annals of Library And Information Studies**, 64, 2017, 113–115.
- Tella, A., Ukwoma, S. C., & Adeniyi, I. K. *A Two Models Modification for Determining Cloud Computing Adoption for Web-Based Services in Academic Libraries in Nigeria*. **Journal Of Academic Librarianship**, 46(6), 2020. 102255. <https://doi.org/10.1016/J.Acalib.2020.102255>
- Theiss, D., *Distance and Online Learners and Library Anxiety: An Exploration into The Causes, Impact, And Recommendations for Practice*. **Journal of Library & Information Services in Distance Learning**, 16(2), 2022. Pp.152-167.
- Trivedi, D. Bhatt, A. & Dineshbhai, S. S. *Service Quality Dimensions and Quality View Point of University Library Personnel In Gujarat*, **Library Philosophy And Practice** 2021.
- Twum, K. K., Yalley, A. A., Agyapong, G. K. Q., & Ofori. D., *The Influence of Public University Library Service Quality and Library Brand Image on User Loyalty*, **International Review on Public and Nonprofit Marketing**, 18(2), 2021, 207-227.
- Ukwetang, J. O., Nja, C. O., Eneyo, E., Ambe, B. A., & Etta, A. B. *Usage of information communication technology (ICT) and academic performance of students in tourism in selected secondary schools in Calabar Municipality in Cross River State, Nigeria*. **European Journal of Social Sciences**, 62(3), 2021. 79-88.
- Ullah, I., Khusro, S., & Ullah, A. *Library Management Practices in the Libraries of Pakistan*. **Information Technology and Libraries**, 41(3). 2022.
- Umeji, E. C., Ejedafiru, E. F. & Oghenetega, L. *Information /ICT Literacy Levels and Skills among Library Personnel in Madonna University Library, Okija*. **IOSR Journal of Humanities and Social Science** 15.3: 2013. 70-75.
- Van Dyk, R., & Van Belle, J. P. *Factors influencing the intended adoption of digital transformation: a South African case study*. In *2019 Federated Conference on Computer Science and Information Systems (FedCSIS)* **IEEE**. 2019, pp. 519-528.
- Vuorikari, R., Punie, Y., Gomez, S. C., & Van Den Brande, G. *DigComp 2.0: The digital competence framework for citizens. Update phase 1: The conceptual reference model* (No. JRC101254). **Joint Research Centre (Seville site)**. 2016
- Wong, M. A., & Saunders, L. (Eds.). *Reference and Information Services: An Introduction*. ABC-Clio. 2020.

- Wu, C. H., Yuan, Y. H., & Tsai, S. B. *Using The Dematel Model to Expose Core Causal Items of Libqual for Improving Library Service Quality: From the Perspective of Big Data*. **Soft Computing**, 24(8), 2020. 5729-5739.
- Wu, L. & Chiu, M.L., *Organizational Applications Of It Innovation And Firm's Competitive Performance: A Resource-Based View And The Innovation Diffusion Approach*. **Journal Of Engineering and Technology Management**, 35, 2015. Pp.25-44.
- Xudoyberdiyeva, D.A., *Management of the Services Sector and its Classification*. **Theoretical & Applied Science**, (10), 2019. Pp.656-658.
- Yakubu, As., Ibrahim, Fl., Yahaya, *A Data Security Factors Influencing the Adoption of Cloud Computing Services by Two Selected Nigerian Academic Libraries*. **Inter. J. Acad. Lib. Info. Sci.** 9(1): 2021. 31-40
- Yuvaraj, M., *Problems and Prospects of Implementing Cloud Computing in University Libraries: A Case Study of Banaras Hindu University Library System*. **Library Review**. 2015.
- Zhouli, Q. Huang, Z., & Chiu, D.K., *Undergraduates' Electronic Resources Diffusion At The Peking University: An Exploration On Language Impacts*. **Library Collections, Acquisitions, & Technical Services**, 40(1-2), 2017. Pp.1-9.
- Zubairu, Aishatu Nya; Akinola, John Olugbenga & Hamzat, Saheed Abiola, "Awareness An Adoption of Cloud Computing In Nigerian Libraries: An Aid To Library Services" **Library Philosophy And Practice (E-Journal)**. 4973. 2021. <https://Digitalcommons.Unl.Edu/Libphilprac/4973>

#### **Theses/Dissertations**

- Guchacha, J., *Integration of Cloud Computing and Service Delivery in Academic Libraries with Reference to South Eastern Kenya University*, Doctoral Dissertation, University of Nairobi. 2019.
- Rahman, M. N. "Exploring the Factors Influencing Big Data Technology Acceptance". Dissertations Portland State University Paper, 2020, 5515. <https://doi.org/10.15760/etd.7389>.

## Appendix

**Lead City University Ibadan  
Faculty of Communication and Information Science  
Department of Information Management**

**Questionnaire on Characteristics of Cloud Computing and Digital Literacy  
Competency as Determinant of Service Quality Among Library Personnel in  
Federal Universities  
(QUCCODICOSQ)**

Dear respondent,

This questionnaire is designed to collect data for a thesis on the factors affecting the quality of library services in academic libraries of federal universities in Southwest Nigeria. Please spare a few moments to respond to the questions and statements in the questionnaire. All responses provided will be treated with utmost confidentiality and used solely for research purposes. Thanks for your cooperation.

Yours faithfully,

**Researcher**

### **Section A: Demographic Information**

1. Name of Institution: .....
2. Gender: Male [  ]; Female [  ]
3. Age Range: < 25 [  ]; 25 – 29 [  ]; 30 – 34 [  ]; 35 – 39 [  ]; 40 – 44 [  ]; 45 – 49 [  ]; 50 and above [  ];
4. Rank/Cadre: Library Officer [  ]; Asst. Librarian [  ]; Librarian II [  ]; Librarian I [  ]; Senior Librarian [  ]; Principal Librarian [  ];
5. Library Section: Technical [  ]; Readers services [  ]; Serials Management [  ]; E-Library [  ]

**Section B: Level of service quality in Academic Libraries.**

**Instruction:** Please select the most appropriate response

Key: SA=Strongly Agree, A=Agree, D=Disagree, SD=Strongly Disagree

S/N	Affect of Service	SA	A	D	SD
1.	Majority of library personnel in my library understand users' information needs				
2.	Majority of library personnel in my library are willing to help users				
3.	Majority of library personnel in my library give users individual attention				
4.	Majority of library personnel in my library instill confidence in users				
5.	Majority of library personnel in my library have enough knowledge to answer user questions				
	<b>Information Control</b>				
6.	My library provides unrestricted access to electronic information resources				
7.	My library has digital equipment that allow users to easily access needed information				
8.	My library has access tools that allow users to find materials on their own				
9.	My library has website/information system that enhance quick access to needed information				
10.	My library makes information resources easily accessible for individual use				
	<b>Library as Place</b>				
1.	My library is conducive for study and learning				
2.	My library has separate spaces for individual and group activities				
3.	My library building is located in a welcoming and comfortable environment				
4.	My library has attractive and aesthetic features				
5.	My library has comfortable furniture and equipment				

### Section C: Characteristics of Cloud Computing among Library personnel

**Instruction:** Please select the most appropriate response

Key: SA=Strongly Agree, A=Agree, D=Disagree, SD=Strongly Disagree

S/N	Statement	SA	A	D	SD
	<b>Relative advantage</b>				
1.	Using cloud computing is cost effective and can help the library reduce cost of infrastructure' saving financially				
2.	Adoption of cloud computing will provide a more protective environment than using library servers				
3.	Adoption of cloud computing improves the quality of library services than using other similar technologies				
4.	Libraries using cloud computing use are seen as more advanced than those who use only use stand-alone storage				
	<b>Compatibility</b>				
1.	Cloud computing is easily compatible with the existing IT infrastructure in my library.				
2.	I think using cloud computing fits well with the way my library has been operating				
3.	I have used other technologies similar to cloud computing				
4.	I have previous positive experience with the use of cloud computing				
5.	Cloud computing services have the right features to meet the types of services my library need to provide				
	<b>Complexity</b>	SA	A	D	SD
1.	Using Cloud computing is simple and straightforward				
2.	Any library personnel can easily learn how to make use of cloud computing services.				
3.	Majority of cloud computing services usually come with easy to understand instructions				

## Section D: Digital Literacy Competency

Please rate your level of digital literacy skills by responding to the following statements

Instruction; Tick the box as appropriate: 4= Very high extent, (VHE) 3= High Extent, (HE) 2= Low Extent (LE)and 1= Very Low Extent (VLE)

S/N	Statements	VHE	HE	LE	VLE
	<b>Information and data literacy</b>				
1.	I am able to articulate my information needs while using the internet,				
2.	I am able to search for any digital content in online environments,				
3.	I have the needed skills to analyze, compare and critically evaluate the credibility of sources I use.				
4.	I have the needed skills to store, manage and organize digital information resources.				
	<b>Communication and Collaboration</b>				
1.	I have the needed skills to use the internet to connect with others using various digital devices and software				
2.	I have the needed skills to select appropriate digital technologies to share data, information and digital content				
3.	I have the needed skills to relevant digital tools and technologies for collaborative processes select well-defined and routine digital tools and technologies for collaborative processes.				
4.	I am aware of the proper mode of behavior while using digital technologies and interacting in digital environments				
	<b>Digital Content Creation</b>				
1.	I have the skills to create and edit digital content in different formats				
2.	I have the skills to modify, refine and integrate new information and content into an existing body of knowledge to create new, original and relevant content and knowledge.				
3.	I can give understandable instructions to retrieve information from a computer system.				

4.	I understand how copyright and licenses apply to data, information and digital content.				
----	---	--	--	--	--

**INTERVIEW GUIDE:**

1. How would you rate the quality of service rendered by library personnel in this library?
2. How frequently do you receive complaint from students and staff about library services or library personnel?
3. What are the areas where cloud computing can be useful for your library?
4. What is the general perception of cloud computing among library personnel in this library?
5. How would you rate the digital literacy competency of library personnel in this library?
6. How positive or negative is the feedback received from library users?

Lead City University Ibadan DO NOT COPY

### **Bio Data**

**Name:** Adedayo Temitope AKINYEMI, CLN  
**Sex:** Female  
**Marital Status:** Married  
**Date and Place of Birth:** 19<sup>th</sup> May 1977, Abeokuta  
**Nationality:** Nigerian  
**State of Origin:** Ogun  
**Local Govt. Area:** Abeokuta South  
**Address:** 2, Shalom Villa, ilupeju Estate, Kotopo , Abeokuta  
**E-mail address:** akinadetope0618@gmail.com  
**Phone number:** 08030655845/09013323380  
**Next of Kin:** Engr.Olayinka.O. Akinyemi

### **EDUCATION**

- Master of Library and information Science (MLIS)
- Bachelor of Library and information Science (BLIS)
- National Certificate in Education (NCE)
- West African Examination Council (WAEC)

### **Membership of Professional/Bodies/Learned Societies:**

Member, Nigerian Library Association (NLA), Ogun State Chapter

Member, Librarian Registration Council of Nigeria (LRCN)

Member, Association of women Librarians in Nigeria (AWLIN)

Member, Teachers Registration Council of Nigeria (TRCN)

Member, Science Teachers Association of Nigeria (STAN)

**Published Articles:**

- A.T. AKINYEMI(2008) “ A study of the Preservation and Conservation of Electronic Information Resources in Academic Libraries: A case study of Kenneth Dike Library (University of Ibadan) and Nimbe Adedipe Library (FUNAAB)”. A published BLIS Thesis submitted to the department of Library Archival and Information studies, University of Ibadan.
- A. T. AKINYEMI (2014), “ Self-Awareness, Cognitive Ability, Internet Information Resources Utilization and Academic Performance of Final Year Social Science Undergraduates in Federal Universities in Nigeria. A published MLIS Thesis, University of Ibadan.
- A. T. AKINYEMI (2022) “ Poverty Eradication: The Roles of Academic Libraries towards the achievement of Sustainable development goals (SDGs). Journal of interdisciplinary and innovative Research in General studies in Education (JIIRGSE), Volume 1, no.1, April 2022, pg. 58 – 64
- A. T. AKINYEMI and EKUNDAYO P.F. 2020. “Public Library in a digital age: A gateway in equipping women towards a healthy society”. SJCIE Scholarly Journal of Contemporary Issues in Education. Volume 2 no.1, pg. 132 -141.
- A. T. AKINYEMI, S. A. OLAWEPO & F. O. ADEDEJI (May 2021) “ Marketing Information Services for Effective Utilization of Libraries in an Information Age. Trends and issues on Global Challenges”: The Scholarly Reflections and Dynamics of a Visionary Leader. A Festschrift for Dr. Ayodele Adetayo Ajayi. Pg. 154 – 158
- A. T. AKINYEMI (2023), “Library Aesthetic as a Motivating factor for improving Reading Culture in Academic Libraries in Ogun State, Nigeria”Celebrating Passion for Unionism and Academics Achievements. A Festrichrift in honour of Alhaji N.O. Sodipe, Mr N. E. Nweke-Richard & Mr. R .A. Adenrele. Pg. 296 – 305.

**Articles Accepted for Publication:**

A.T. Akinyemi, F.O. Adedeji & S.A. Olawepo, 2023, “Prospects of Digitization Practices in College of Education Libraries in Ogun State, Nigeria”at the 31<sup>st</sup> National Conference

& AGM of Committee of College Librarians (COCLIN) in Nigeria held at College of Education, Warri, Delta State.

A.T. Akinyemi & S. O. Tunmibi, Dec. 2023 “ Exploring Information Literacy Towards Sustainable Development Goals in Nigeria” 1<sup>st</sup> international Conference at Lead City University, Ibadan, Faculty of Communication and information Science.

A.T. Akinyemi & P.F. Ekundayo, “ Preservation and Conservation of Electronic Resources in Kenneth Dike Library, University of Ibadan And Nimbe Adedipe Library, FUNAAB, Abk”, Olumo Journal of Education. Vol.7 – N0 1(June 2020 )ISSN 1117 – 4390.

J.A. Adesina & A. T. Akinyemi “ Perception of Undergraduates Students on the Role of E-Libraries in Enhancing Attitudinal Change for a better Nigeria. Journal of Committee of College Librarians in Nigeria, Vol. 13 Nos. 1 & 2, Dec. 2020.

#### **Certificate and Trainings:**

Committee of College Librarians in Nigeria (COCLIN), May2023

Nigerian Library Association (NLA), August 2022

Committee of Colleges of Librarians in Nigeria (COCLIN), Dec. 2020

Training Workshop & Conference organized by Ogun State Library Board on the

Theme” Repositioning of Public Libraries in Ogun State for Effective Service

Delivery.Held at Green Legacy Resort, Hill Top Annex, Obasanjo Presidential Library,

Abeokuta, Ogun State. 18<sup>th</sup> – 20<sup>th</sup> February, 2020.

#### **Awards and Fellowship**

- Skills and Competencies:
- Teaching
- Counselling
- Reading

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**University Compliance Certification**

This is to certify that this Thesis written by Adedayo Temitope AKINYEMI with Matriculation No. LCU/PG/002222 in the Department of Information Management of the Faculty of Communication and Information Sciences, Lead City University, Ibadan is in full compliance with the approved University format and style.

\_\_\_\_\_  
**Name and Signature**

\_\_\_\_\_  
**Date**

Lead City University Ibadan DO NOT COPY