

A study of awareness and utilization of cloud computing for information storage and retrieval in selected academic libraries in south west universities in Nigeria.

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ABSTRACT

This study investigates the level of awareness and utilization of cloud computing for information storage and retrieval in selected academic Libraries in South West Universities in Nigeria. This is against the background of the low level of awareness among the universities based Libraries in Nigeria. Descriptive survey method was adopted while a questionnaire, observations and checklists were used for data collection. The research study used stratified sampling techniques to select the University Libraries and Librarians and staff from the South West Geo-Political Zone on the probability or otherwise integration of cloud computing. A total of one hundred and twenty (120) librarians and Staffs of the selected universities was used as population of the study across the six (6) Universities selected for the study. Data were analyzed using Pearson Product moment correlation at 0.05 level of significance. The result of impact of cloud computing had mean score of (\bar{x} = 3.25) indicating a high impact of information services and retrieval. The awareness level of cloud computing was moderate at (\bar{x} = 2.88), utilization of cloud computing was high at (\bar{x} = 3.26), the level of challenge was moderate at (\bar{x} = 2.79), while the level of benefit derivable from the use of cloud computing was high at (\bar{x} = 3.29). The study reveals a positive and joint relationship between Awareness, Utilization, challenges and benefit of cloud computing on information services and retrieval in University Libraries in South West Geo-Political zone.

Keywords: Awareness, Utilization, Cloud Computing, Information Storage and Retrieval

I. CHAPTER ONE

INTRODUCTION

Cloud computing is a new ICT invention that its potency is not doubtful, while it has been acknowledged as a major breakthrough in information storage and retrieval system worldwide because of its unlimited capacity for storage and retrieval. Despite the enormous advantages there exist a controversy about what cloud computing is, or is not. Hayes (2008) defined “cloud computing as a kind of computing which is highly scalable and use virtualized resources that can be shared by the users. Users do not need any background knowledge of the services before using it. Moreover, a user on the internet can communicate with many servers at the same time and these servers exchange information with one another. Basically, data and adoption in the cloud are available through the internet; it can also be accessed from everywhere and from any device with internet connectivity.

Stroh et al, (2009) posted that “cloud computing as “the computing software and services that can be accessed via the internet rather than residing on a desktop or internal server.” Gartner (2012) defined cloud computing as “a style of computing in which massively scalable and elastic IT-enabled capabilities are delivered as a service to external customers using internet technologies. “In various presentations Klynveld Peat Marwick Goerdeler (KPMG) grouped this into four different types of cloud computing, namely: Infrastructure, Platform, Applications and Services. Infrastructure is buying Space/ times on external servers, Examples are Amazons, A3, and Bungee. Platform on the other hand, is an existing software platform in which one can build its own application on, such as Facebook. While Application is a software

application accessed with a Web browser, examples are Google Docs, Salesforce.com, whereas, Service is a ready to use services accessed with a Web browser such as ADP.

This provides library with an opportunity to extend its impact to its users anywhere anytime. Anyone connected to the internet is probably using some type of cloud computing on a regular basis. Whether they are using Google's Gmail, Organizing photos on Flickr or searching the Web with Bing they are engaged in cloud environment. As Geoffrey (2013) pointed out, the interesting thing about cloud computing is that it did not start as a technology for the business enterprise, but was driven by the public with services like Facebook and Flickr.

Education today is becoming completely associated with Information Technology (IT) on content delivery, communication and collaboration. The need for server, storage and software are highly demanding in the Universities, For example, the National Open University of Nigeria (NOUN), that provides its services via online, operates an e-learning Management System known as ILEARN for lectures and notes. It also operates a digital library known as INFORMATION GATEWAY which offers Multimedia tutorials.

Much like a common utility, one just pays for what was used, and then turn it off when one is done. The ability to have a server somewhere, to not have to worry about it, turn it up as needed, and pay for only what is used attracts a lot of people to cloud deployment (Creeger, 2009), Library community can apply cloud infrastructure to amplify the power of cooperation and to build a significant, unified presence on the Web. This approach to computing can help libraries save time and money while simplifying workflows. To date, the main focus of libraries moving into the cloud has been due to, the need to disclose their vast collections. (Gbaje and Aliyu 2014). The global information revolution of the 20th century made manual systems of delivering information services in the libraries especially academic and research libraries mundane, clumsy and inefficient, though the era of total electronic or paperless libraries is yet a mirage. Aguolu & Aguolu (2002), information communication technology has brought change to many activities of our present day libraries from digital contents providers and hardcopies. However, in recent days, due to technology growth, advances in computing power, storage and networking technology have allowed the human race to generate process and share increasing amounts of information in dramatically new ways. With the recent familiarization with

applications of computing technology, these applications are often used which usually lead to demands for even more powerful computing infrastructure.

The convergence of cloud computing and telecommunications has dramatically affected the provision of library and information services. Many libraries have started integrating themselves with information communication technology on content delivery, communication and collaboration by adopting cloud computing currently often been used by libraries in Nigeria. In the library, cloud computing is used to put together a digital library and to computerize housekeeping operations using third party services, software and hardware. It has the capability to change the way information systems are built and services delivered by giving ample opportunities to libraries to extend its impact to its users at anywhere and time. Thus, any library user who connect to the internet is using some type of cloud computing services for example Gmail, Yahoo mail and searching the web with baling. Cloud Computing is seen as a technology that uses the internet and central server to maintain data, software and applications. Posit that, cloud computing enables task distribution in large number by collecting large amount of information stored in personal computer and other tools by integrating and putting them on public cloud for serving users. Cloud computing can also be seen as service model for computing resources that can be accessed in a flexible, elastic, on demand way with low management effort. It helps to integrate large quantity of information resources stored in Personal Computers, mobile phones and other equipments by putting them on the public cloud for serving users. University Libraries are established to support the teaching, learning, research and community service of their parent institutions by acquiring, processing, storing, preserving and making information available to user. It is conceived by Digital Library that the cloud can manage collection of information, with associated services, where the information is stored in digital formats and accessible over a network. The client do not need to border about the amount of space of information resource in cloud computing. The advent of cloud computing has greatly assisted most businesses and organizations to deliver quality services to their customers via the internet. The National Institute of Standards and Technology defines cloud computing as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and

released with minimal management effort or service provider interaction (Mell, 2009). Similarly, Priya (2011), also defined Cloud computing as a technology which provide you a service through which you can use all the computer hardware and software sitting on your desktop, or somewhere inside your network but they are not actually installed on your computer, it is provided for you as a service by another company and accessed over the Internet. Dave Cleveland (2012), in his definition defined Cloud computing as a technology that uses the Internet alongside the central remote servers to maintain data and application. Hence, cloud computing is a fast emerging technology that permits users to store files, share files and applications on the Internet.

Olabiyisi et al. (2012), explained that cloud computing is an elastic, enduring and scalable utility model that offers flexible, ubiquitous, on-demand network access to a shared pool of configurable computing resources (for example, servers, data centers, networks, applications and services) that can be rapidly provided and released with limited interaction of service provider or the management. It provides shared infrastructure, self-service, dynamic and virtualized pay-per-use platforms which put it on high demand. Cloud computing implies a level of dynamic, flexible resource sharing and allocation of assets.

According to Tuncay (2010), library can benefit from using cloud computing technology by increasing computing performance, storage capacity, universal accessibility and cost reduction. This can help library in terms of fixed and maintenance cost reduction in the IT investment of both hardware and software as well as computer services. With cloud computing, libraries may prevent financial waste, better track staff activities, and avert technological headaches such as computer viruses, system crashes, and loss of data. When cloud computing is used in the library, this will likely have a significant impact on library services. According to Spreeuwenberg (2012), with cloud computing, it becomes easier to access data with several devices. Especially for mobile devices, this can be really useful since the only thing that is needed is an internet connection. Libraries are shifting their services to cloud computing technology to facilitate its services anywhere and anytime. In libraries, the following have been identified as possible areas of applying cloud computing: Building Digital Library/Repositories, Searching Library Data, Web Site Hosting, Searching Scholarly Content, File Storage,

Building Community Power and Library Automation.

Nevertheless, the biggest benefit of the adoption of cloud computing technology is that one does not “buy” the cloud as purchases for software and hardware and hitherto being made for library automation. Much like a common utility, one just pays for what was used, and then turn it off when one is done. The ability to have a server somewhere, to not have to worry about it, turn it up as needed, and pay for only what is used attracts a lot of people to cloud deployment Creeger (2009), Library community can apply cloud infrastructure to amplify the power of cooperation and to build a significant, unified presence on the Web.

OBJECTIVES OF THE STUDY

The specific objectives are:

1. To identify the impact of cloud computing in academic libraries among south west universities libraries in Nigeria;
2. To determine the level of awareness of cloud computing among the universities libraries in south west Nigeria;
3. To determine the level of utilization of cloud computing among the universities libraries in south west Nigeria;
4. To identify the challenges facing the use of cloud computing in academic libraries among universities libraries in south west Nigeria;
5. To proffer solution to the challenges facing the use of cloud computing in university library in south west Nigeria;

RESEARCH QUESTIONS

1. What are the impacts of cloud computing in academic libraries among south west universities libraries in Nigeria?
2. What are the levels of awareness of cloud computing in academic libraries among south west universities libraries in Nigeria?
3. What are the levels of utilization of cloud computing in academic libraries among south west universities libraries in Nigeria?
4. What are the challenges facing the use of cloud computing in academic libraries among south west universities libraries in Nigeria?
5. What are the solutions to the problems facing the use of cloud computing in academic libraries among south west universities libraries in Nigeria?

II. CHAPTER TWO LITERATURE REVIEW

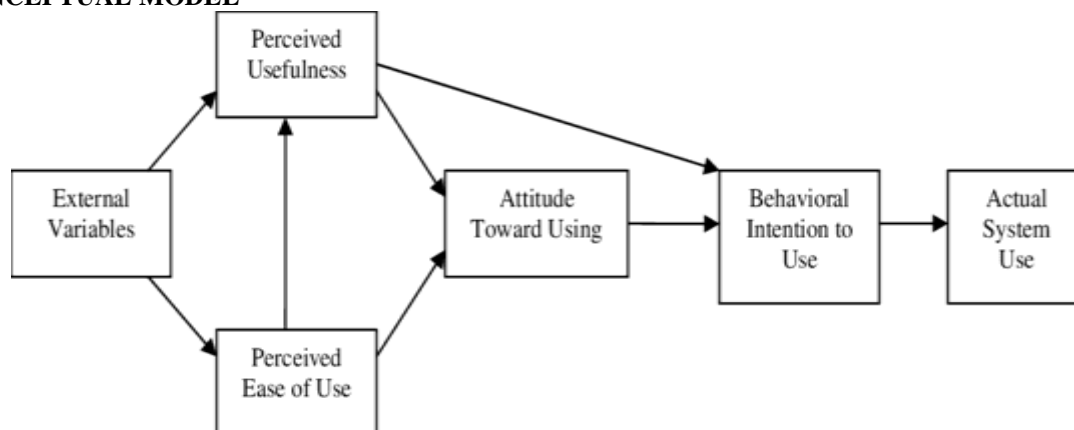
Library network is a collective or co-operative activity of linking members/users to the resources hosted on computers by means of

telecommunication connections. Lihitkar (2012) asserted that a network is developed when a group of libraries and information centers have common interest to exchange information through computer and communication technology. Dhenavandah & Tamizhchelvan (2014) identified classification of Networks based on Utility criterion: Resource sharing network, Data sharing network communication and data exchange network. Resource sharing network main purpose is sharing of resources and other applications that are subordinate in nature, data sharing network provides access to unique databases from workstations situated at distance apart, while communication data exchange network allows users to exchange data, graph or documents and to communicate with each other using such devices as electronic mail, bulletin board etc. The state of library's networking system depends on the availability and quality of electrical power and the type and distribution of electrical wiring in the library through computer network observed by Eric (2012). Computers operate better and last longer when the computer network that powers the library is continuous and of consistent voltage.

Many libraries, especially academic libraries need sufficient supply of network to withstand the additional demand made by the computers asserted by Kessler (2013). Furthermore, networks cables may not be the correct gauge to withstand the additional load caused by computers being connected to the library's networking system according to Eric (2012). One reason why many libraries decide to install computer network in libraries is to overcome the challenges and issues of poor computer networking that may require the library to refurbish the existing network system or add a whole new network supply system which reduces the amount of electrical wiring needed. Also, computers, especially those connected to a local area network (LAN), require a grounded electrical system to operate smoothly and trouble free. Again, this is less costly if done to one or two computer in the library rather than to the entire library.

The computer network used during the last several decades in libraries has made a massive shift from traditional concepts of "the library". The catalyst for this shift has been the computer network asserted by Kessler (2012)

CONCEPTUAL MODEL



Source: Adopted from Technology Acceptance Model (TAM 1)

The acceptance of an information system generally refers to users' decision on whether they should buy or implement it and further use it in the long term, in the sense of active willingness and not only in the sense of reactive toleration (Arnold and Klee, 2016). Over the past 30 years, many different models have been developed to describe and link people, systems, and contextual factors with potential impact on the acceptance of information systems. The most influential, most tested, and best-operationalized approach is the Technology Acceptance Model (TAM) (Davis, 1989).

**III. CHAPTER THREE
 ANALYSE, DISCUSSION & FINDINGS**

This chapter presents the results of the analysis of the data gathered from the respondents from the selected South-west Universities in Nigeria and discussion of findings. Descriptive statistics of mean rating and standard deviation were used to answer the research questions raised in Chapter one of this study while inferential statistics of multiple regression analysis, and Pearson Product Moment Correlation statistical tools were used to test the hypotheses formulated respectively at 0.05 level of significance. Out of the

120 copies of questionnaires distributed, only 107 (89.2%) were returned for analysis.

Research Question One: What are the impacts of cloud computing in academic libraries among South West Universities in Nigeria?

Research Question One was answered based on the responses obtained from the staffs of the sampled selected academic libraries in South West University, Nigeria as shown in Table 4. Descriptive statistics of mean and standard deviation were used to analyse the data and answer research question one.

Table 4
Mean and Standard Deviation of Impacts of Cloud Computing in academic libraries among South West Universities in Nigeria.

Impact of Cloud Computing	N	Mean	Std. Deviation	Decision
I believe the cloud computing is trustworthy	107	3.52	.356	High
I believe that cloud computing is capable of overcoming all kinds of technical difficulties	107	3.27	.418	High
I believe that certain technical procedures exist to protect personal and governmental information	107	3.32	.497	High
I believe that cloud computing is capable of overcoming all kinds of technical difficulties	107	3.10	.538	High
I believe that cloud computing providers will protect users' rights	107	3.04	.541	High
Average Mean	107	3.25	.470	High

Decision Rule:

\bar{X}

1.00 -2.0Low (L)

2.01- 3.0Moderate (M)

3.01 – 4.0 High (H)

The research question one was answered using a mean rating based on the data obtained from the respondents of the sampled academic libraries in South-west University shown in Table 4. The analysis indicated that the impact of cloud computing in academic libraries among South West University in Nigeria as assessed by libraries staffs had mean score of 3.52, 3.27, 3.32, 3.10 and 3.04 respectively and were found to be high at ($\bar{x}=3.25$)

since the mean value falls between the benchmark of 2.01 – 3.00, this means that the impact of cloud computing in academic libraries among South West Universities libraries in Nigeria was high.

Research Question Two: What are the levels of awareness of cloud computing in academic libraries among South West Universities in Nigeria?

Research Question Two was answered based on the responses obtained from the staffs of the sampled selected academic libraries in South West University, Nigeria as shown in Table 5. Descriptive statistics of mean and standard deviation were used to analyze the data and answer research question two.

Table 5:
Mean and Standard Deviation of level of awareness of Cloud Computing in academic libraries among South West Universities in Nigeria.

Level of Awareness of Cloud Computing	N	Mean	Std. Deviation	Decision
I have good knowledge of cloud computing	107	3.15	.478	High
I have good knowledge about the underlying structure of cloud computing	107	2.81	.564	Moderate
I have good knowledge of the benefits of using cloud computing	107	2.46	.641	Moderate
I usually read the information on cloud computing services	107	2.27	.749	Moderate
In overall, I am knowledgeable about cloud computing technology	107	3.72	.328	High
Average Mean	107	2.88	.552	Moderate

Decision Rule:
 \bar{X}

- 1.00 -2.0 Low (L)
- 2.01- 3.0 Moderate (M)
- 3.01 – 4.0 High (H)

The research question two was answered using a mean rating based on the data obtained from the respondents of the sampled academic libraries in South-west University shown in Table 5. The analysis indicated that the level of challenges of cloud computing in South West University in Nigeria as assessed by libraries staffs had mean score of 3.15, 2.81, 2.46, 2.27 and 3.72 respectively and were found to be moderate at

(\bar{x} =2.88) since the mean value falls between the benchmark of 2.01 – 3.00, this means that level of awareness of cloud computing was moderate.

Research Question Three: What are the levels of utilization of cloud computing in academic libraries among South West Universities Libraries in Nigeria?

Research Question three was answered based on the responses obtained from the staffs of the sampled selected academic libraries in South West University, Nigeria as shown in Table 6. Descriptive statistics of mean and standard deviation were used to analyze the data and answer research question three.

Table 6
Mean and Standard deviation of level of utilization of cloud computing in academic libraries among South West University libraries in Nigeria

Levels of utilization of Cloud Computing	N	Mean	Std. Deviation	Decision
Other people come to me for advice on cloud computing services	107	3.54	.502	High
I am among the first in my circle of friends to use cloud computing services when it was implemented	107	3.10	.437	High
I can usually figure out new features of cloud computing services without the help from others	107	3.28	.662	High
I have fewer problems compared to other people in using cloud computing services	107	3.15	.311	High

I keep up with the latest technology on cloud computing in my areas of interest	107	3.24	.405	High
Average Mean	107	3.26	.463	High

Decision Rule:

\bar{X}

- 1.00 -2.0Low (L)
- 2.01- 3.0Moderate (M)
- 3.01 – 4.0 High (H)

The research question three was answered using a mean rating based on the data obtained from the respondents of the sampled academic libraries in South-west University shown in Table 6. The analysis indicated that the level of utilization of cloud computing in academic libraries among South West University in Nigeria as assessed by libraries staffs had mean score of 3.54, 3.10, 3.28, 3.15 and 3.24 respectively and were found to be High at (\bar{x} =3.26) since the mean value falls between the benchmark of 2.01 – 3.00, this means that levels of utilization of cloud computing in academic libraries among south west universities in Nigeria was High.

Research Question Four: What are the challenges facing the use of cloud computing in academic libraries among South West Universities Libraries in Nigeria?

Research Question Four was answered based on the responses obtained from the staffs of the sampled selected academic libraries in South West University, Nigeria as shown in Table 7. Descriptive statistics of mean and standard deviation were used to analyze the data and answer research question four.

Table 7
Mean and Standard deviation of challenges of cloud computing in academic libraries among South West University libraries in Nigeria

Challenges facing the use of Cloud Computing	N	Mean	Std. Deviation	Decision
People who influence my behavior think that I should use cloud computing	107	2.21	.821	Moderate
People who are important to me think that I should use cloud computing	107	2.99	.614	Moderate
The libraries is helpful in the use of cloud computing	107	3.10	.437	High
People around me is helpful in the use of cloud computing	107	2.64	.738	Moderate
In general, libraries in some institution support the use of cloud computing	107	3.00	.485	High
Average Mean	107	2.79	.619	Moderate

Decision Rule:

\bar{X}

- 1.00 -2.0Low (L)
- 2.01- 3.0Moderate (M)
- 3.01 – 4.0 High (H)

The research question four was answered using a mean rating based on the data obtained from the respondents of the sampled academic

libraries in South-west University shown in Table 7. The analysis indicated that the level of awareness of cloud computing in South West University in Nigeria as assessed by libraries staffs had mean score of 2.21, 2.99, 3.10, 2.64, and 3.00 respectively and were found to be moderate at (\bar{x} =2.79) since the mean value falls between the benchmark of 2.01 – 3.00, this means that level of challenges of cloud computing was moderate.

Research Question Five: What are the level of using cloud computing in academic libraries among South West Universities Libraries in Nigeria?

Research Question five was answered based on the responses obtained from the staffs of the sampled selected academic libraries in South West University, Nigeria as shown in Table 8. Descriptive statistics of mean and standard deviation were used to analyze the data and answer research question five.

IV. CHAPTER FOUR

Summary, Conclusion, and Recommendations

This chapter has presented the summary of the findings of the study, conclusion, and recommendation.

Summary of findings:

The following are the major findings of the study:
All the libraries in Nigeria Universities in south west geo- political zone has I.C.T (information and communication technology) section in their libraries with state of the arts that can accommodate and sustain cloud computing technology to enhance effective service delivery.
All the libraries in the south west Nigeria Universities has competent ICT experts that can manned the various ICT section of its library effectively.
The desktop and laptops, found in the ICT section of the library in the universities were only been used by students and staff.
The university libraries in the south west geo-political zone had adequate physical and human resources such as ICT technologist, programmers, and technicians that can allow cloud computing to flourish if it is incorporated along with the current information storage and retrieval system.
The study reveals that the impact of cloud computing in academic libraries among the south west universities libraries in Nigeria was very high.
The study reveals that the level of awareness of cloud computing was moderate among the south west geo- political zone universities in Nigeria.
The level of utilization of cloud computing in academic libraries among the south west geo-political zone universities in Nigeria was high.
The level of challenges of cloud computing among the universities libraries in academic institutions especially, the universities in the south west was moderate.
The associated benefits of cloud computing in the university libraries in south west geo-political zone was high.
All the predictors of awareness, use, information retrieval, and challenges have positive relationship

with cloud computing in libraries in the south west universities in Nigeria.

The level of awareness has positive effect on the impact of cloud computing in academic libraries in south west universities in Nigeria.

The level of utilization also has positive effect on the impact of cloud computing in academic libraries in south west universities in Nigeria.

The challenges of cloud computing has moderate effect on the impact of cloud computing in academic libraries in south west universities in Nigeria.

The impact of information storage on cloud computing has positive relationship on effective service delivery in the libraries in the universities in south west Nigeria.

All the variable jointly has significant and positive relationship with cloud computing in the universities libraries in the south west zone.

V. RECOMMENDATION AND CONCLUSIONS

Based on the findings of the study, the following recommendation is hereby made;

The results of the study reveals that the impact of the cloud computing on information retrieval and storage was high. It implies that libraries in the universities have realized the potency of cloud computing if founded adequately for effective library service delivery it is therefore, recommended that other libraries yet to inculcate cloud computing to its behind the scene operations should be financed for a better outcome.

The study confirmed the awareness and utilization of cloud computing as having positive and significant effect on information storage and retrieval in academic libraries in the university based tertiary institutions in Nigeria. Cloud computing enhance the quality of information availability, accessibility and use among the students and staffs beyond borders, considering the global coverage and resource sharing activities among the participating institutions with similar content. Cloud computing have permanent storage of all information resources in the libraries and a valuable option to disaster in cases of emergency. Institutions that are yet to embrace cloud computing are hereby admonished to do so in harness in order to expand their frontier of knowledge and add quality to their research output.

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