



Research Paper

# Relationship between Readiness and Adoption of Cloud Computing For Effective Services Delivery in North West Federal University Libraries

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## Abstract

The study investigated relationship between readiness and adoption of cloud computing for effective services delivery in north west Federal University Libraries. The objectives of the study were To identify the extent library staff are aware of cloud computing: To identify the extent cloud computing applies to library operations To identify the extent of cloud computing is used for the implementation of cloud computing in library operations: To identify the awareness of librarians on the benefits of cloud computing. The study adopted correlational design. The population of the study consisted of 199 professional librarians, Para- professional and ICT staff working in Federal university libraries in North-West Nigeria. No sampling as the entire population size was manageable. The instrument for the collection of data for the study is structured questionnaire called "relationship between readiness and adoption of cloud computing for effective services delivery in north west Federal University Libraries: Observation Check-List (ACFESDN). The drafted questionnaire was face validated by three experts, two of the validates. A trial-testing procedure was used to establish the reliability of the instrument. Copies of the instrument were administered on 30 respondents. Chronbach Alpha ( $\alpha$ ) reliability method was used to determine the internal consistency of 0.82 coefficient of the questionnaire. analyzed using Pearson product moment correlation ( $R$ ). Pearson product correlation analysis was used to ascertain the significant relationship among variables of the study at 0.05 level of significance. The responses to the items were interpreted by describing the strength of the correlation using the guide suggested by Evan (1996) for the absolute value of  $r$  as stated. The decision point of acceptance is that any item that fall between 0.40-0.59 and above is considered positive relationship. While items that fall between 0.40- below is considered negative relationship. **Findings Shows:** There is a significant difference between Librarians, readiness, Operation service, applied operation and implementation. The study **recommends** that the Librarians should handle. Library workers career option in Adoption of Cloud Computing for Effective Services Delivery.

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## I. Introduction

The rapid change and competitive atmosphere in Library Information Technology facilitate active networking resources, services and applications that managed cost and searching made easier than ever. University libraries are always in conformity with new technology that increased efficiency and reduced cost for preservation and dissemination of knowledge to clientele. University library is the focal point around which scholarship revolves; it is a requisite instrument for intellectual development. Roberson (2005) defined university library as an institution that support the educational need of the host institution and manages the intellectual products and processed them in such a manner that the individual can gain access to them readily. Popoola (2008) stated that university libraries by their very nature are expected to acquire, process into retrievable form, and make available the much needed information to the academic community and the public at

large who may require them for their various teaching and research activities. Brophy (2001) opined that at the start of the 21st century, university libraries explore new services development to support a series of new scenarios new modes of study, including ICT and digital based for distance learning, with which libraries had little involvement in the past.

Electronic Library, service, is broadly defined as "service which enables library users to directly access electronic data via telecommunications networks. Nweke, Yakub and Omale (2012), define E-library as a collection of documents in organized electronic form, available on the Internet. According to Ugwuanyi, Okwor, and Ezeji (2011), there is a migration from print to electronic resources, from the library as a place to the virtual library as a result of the 21st century era of information economy. Due to the changes in technologies and the way libraries now operate, it is pertinent for libraries to adopt a shift from paper-based current awareness to electronic and virtual method of current awareness creation in academic libraries (Kiscaden, 2014). Therefore, university library has been the heart of the academic environment that caters for the host institution educational need, has to explore more of ICT base modes like cloud computing to enjoy the economy, global readiness and most importantly shared resources for effective service delivery.

Effective service deliveries are services offered by university library that has to do with ICT base modes to satisfy the host institution program effectively. Moghaddam, (2009) notes that one of the vital elements of effective services and dynamism is specialized human resources. LaRue (2012) firmly believes that the library most powerful asset and effective services is its professional staff. According to the author, librarians have the power to change lives and build community but to do this, they have to leave their desks, leave their buildings and be global to show the community what a powerful tool they are. Tanawade (2011) observed that it is time to publicize ourselves, our professionalism, and the skills people have to offer. Librarian of the 21st century is no longer one that sits behind the reference desk answering mere reference questions but rather an active marketer who sells the library's products and services through online medium to the outside community at every opportunity. Omekwu (2003), mentions basic knowledge of computers and their capabilities; Competency with search engines; internet facilities; e-mail; internet navigator tools, web browsers and web file formats; database software; internet development and management know-how a librarian most possessed to be able to offer effective service delivery. Most especially emerging trend on ICT, computer, internet, search engines, web and most recently cloud computing.

Cloud computing operations and services are software used to provide cloud services. Mell & Grance, (2011) listed some of the Google educational cloud as thus: one of the key components to Google Apps is Google Mail, also called Gmail which are administered by the organization's IT administrator in the institution, schools and universities. It has 7GB of storage per user, built-in chat, and IMAP capability that frees students from concerns about email quotas or spam: Google Sites is easy-to-use let students to create and publish information and media, without having to learn any programming languages. Google Video: provides secure and private video sharing for faculty and students: Google Calendar is a shared calendar management that puts everyone on campus "on the same page when it comes to organizing schedules: Google Talk is the Instant Messaging (IM) component of Google Apps IM is helpful for immediate, limited conversation with a colleague in remote location in the classroom: Google Docs Package: a real-time collaboration on documents, spreadsheets, and presentations that lets researchers and students work together across campus or around the world for better internet-based technologies

Cloud computing as an aspect in internet-based technologies is recognized as an important area for IT innovation and investment which are of the following types; public cloud, private cloud, community cloud and hybrid cloud. Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications, and it has the following components: application, platform, storage and infrastructure. According to Wolf, (2010) cloud computing is the renting of infrastructure and software, as well as bandwidth, under defined service conditions. In simple words the datacenters, hardware and systems software generally call a 'cloud'. Major Cloud providers in Nigeria are Microsoft, Google and International Business Machines (IBM). (T-System,2008). Globally these companies deliver cloud computing services either directly to customers/organizations or in affiliation with other Information Technology (IT). Clouding inform of Cisco, NetApp, Sunnet, Descasio, Wyse technology, Infoware technologies, Accenture, Business Connexion, among others. Cloud computing offer clients mailing service, storage, information collection, file sharing, software applications, presentation, forums and the use of online library of congress cataloguing (OCLC) effectively.

Cloud computing is "any server usage or software application one can access outside the local server which have three major components as thus: clients, data centre and distributed servers. Each element has a definite purpose and plays a specific role. The biggest benefit for libraries is that you don't "buy" the cloud; you just pay for what you use, when you use it, and then turn it off when you're done. Richwalsky, (2009). Therefore, the main advantage in moving to a cloud computing environment for university library is the ability to try out software's without having to buy the hardware as well as being able to scale the computing power to

meet the request of users. A library's IT department handles cloud computing via vendor instead of physically having to obtain new hardware, software and manpower to meet increased demands. This method will save the university libraries spending staff resources and making available information to users.

Availability of cloud computing are special qualities that make cloud computing stand out in current information retrieval and dissemination. Essential characteristics as identified by Grance, (2010) are: massive scale availability of computing and storage capabilities, homogeneity, use of virtualization technology, resilient computing, and pay-as-you go model. Low or no up-front IT infrastructure costs, geographical distribution of clouds, low overhead costs for IT and administration personnel among others. These characteristics make Cloud Computing available and attractive to business organizations and libraries. Computing pattern Cloud Computing has challenges to the organization seeking to adopt it. Shimba (2010) stated that the challenges that are raised are: trust, security, legal, compliance and organizational challenge. Therefore, the greatest fear among librarians is that of putting information in the hands of a third party which the customers may lose ownership as the data is often stored in virtual servers not control by the professional librarians.

Cloud Services application to Library System through the collection of different resources. The way new additions are made in the library, it is very difficult to manage everything with traditional management system. New technologies are available to manage & distribute the resources. According to Yuvaraj (2014) Cloud computing uses the concept of centralizing the data on the internet further making it available to user, anytime anywhere. Virtualized shared resources allow multiple users to access the resources simultaneously. It reduces the dependency of installation, maintenance, failure of ICT infrastructure etc. Web repositories like E-journals & digital libraries etc are created so that users can access the global resources, helping the researcher's educational professionals. (Breeding, 2011). Posits that the newly designed integrated library system is designed with the cloud in mind that is based on SaaS model Online Computer Library Centre OCLC is also one of the cloud computing vendors, providing a platform to access information. It's a research organization designed to reduce the cost of accessing information available globally. In this the Centralized data is managed by the cataloguing tools over the Internet. By maintaining a centralized data source of catalog, multiple libraries can access the resources simultaneously, increasing the sharing of resources, hence reducing the time spent in individual IJRET: International Journal of Research in Engineering and Technology cataloguing of new material. Another example of cloud computing architecture maintaining common catalog is World Cat.

Librarian is professional who works in a library, providing access to information and sometimes social or technical programming to users. Librarians provide instruction on information literacy and proper uses. Youngkin (2014) acknowledges the important role of librarians' ability to apply emerging web technologies to strengthen and enhance research and reference consultations, education and instruction and library outreach programs. Librarianship helps users to know how to navigate into the search of information, internet, evaluate information efficiently and offers a helping hand for users to find out the required piece of information and to use it for personal and professional purposes (BLS, 2011). Librarians as a professional has to work efficiently to get acquainted with new technologies and also adopt them to meet the changing need of the client for effective service delivery in a needed area or region. Therefore, the gap creates in knowledge of professional librarians use of information services from the hard and print materials to global change to internet and electronic information system poses a need to determine the Relationship between readiness and adoption of cloud computing for effective services delivery in north west Federal University Libraries

### **Statement of the Problem**

Library is really a growing organism that acquires information resources every day to be able to serve the changing needs of its user community effectively. In other words, libraries, particularly the academic type are increasingly becoming complex institution due to rapid growth in both print and electronic information resources. Thus, the university library collection is becoming huge, the physical space becoming tight, while the budget estimates are always high. This trend has necessitated the future libraries to shift focus from maintaining huge collection building to networked resources and services. In addition, university libraries are suffering from under funding as such cannot regularly deploy digital infrastructures such as computers, servers, or even subscribe to data bases for enhancement of their service delivery. Moreover, maintenance of ICT infrastructures has been a difficult task in most university libraries in Nigeria.

The professional librarians and non-professional librarians as the frontiers of knowledge disseminations are not aware of cloud computing that will cut cost in university libraries, have secured information against corrupt and virus attack. The applications are not known and cannot be used. Librarians are not in clear picture of benefits like networked service for sharing information resources that are readily accessible at any point in time. However, there are inhibiting factors for the adoption of cloud computing that are hidden to many librarians. In view of the above, there is the urgent need to address this gap of knowledge to enhance effective service delivery; else University Library will continue spending much on acquisition information, wasting of data without necessary usage and possibly loosed information stored in electronic format. It is against this

background that this study seeks to investigate the Relationship between readiness and adoption of cloud computing for effective services delivery in north west Federal University Libraries

**Purpose of the Study**

The main purpose of this study is to determine the Relationship between readiness and adoption of cloud computing for effective services delivery in north west Federal University Libraries. The specific purposes of the study are to:

**Research Question**

1. What is the Relationship between Librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery?
2. What is the relationship Between Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery?
3. What is the Relationship among Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery?

**Hypotheses**

1. Librarians as no influence on Staff readiness in Adoption of Cloud Computing for Effective Services Delivery.
2. There is no significant Relationship Between Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery
3. There is no significant Relationship among the Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery

**Results**

**Research Question1:** Relationship between Librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery

**Table 1: Pearson Correlation Summary of the Relationship Between Librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery**

		Librarians	Staff readiness
Librarians	Pearson Correlation	1	.416**
	Sig. (2-tailed)		.000
	N	180	180
Staff readiness	Pearson Correlation	.416**	1
	Sig. (2-tailed)	.000	
	N	180	180

\*\* . Correlation is significant at the 0.05 level (2-tailed).

Result presented in Table 1 shows that there is a positive and moderate relationship (+.42) between librarians and Staff readiness in Librarians Adoption of Cloud Computing for Effective Services Delivery.

**Table 2: Linear Regression Model Summary of the Relationship Between Librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.416 <sup>a</sup>	.173	.169	.50819	1.967

a. Predictors: (Constant), Librarians  
 b. Dependent Variable: Staff readiness

The linear regression model summary confirmed the result of the Pearson correlation which shows a positive and moderate relationship (+.42) between librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery (Table 2). The coefficient of determination (R Square) of .173 shows that 17.3% Staff readiness in Librarians Adoption of Cloud Computing for Effective Services Delivery is attributed to Librarians. The Durbin-watson value of 1.97 shows that the regression model has no evidence of autocorrelation as it does not exceed the standard limit of 2.44.

Hypothesis 1: Librarians as no significant Relationship with the Staff readiness in Adoption of Cloud Computing for Effective Services Delivery

**Table 3: ANOVA Summary of the Relationship Between Librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery**

Model	Sum of Squares	Df	Mean Square	F	Sig.
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	Regression	9.631	1	9.631	37.293	.000 <sup>b</sup>
1	Residual	45.970	178	.258		
	Total	55.601	179			

a. Dependent Variable: Staff readiness

b. Predictors: (Constant), Librarians

The ANOVA result shows that the overall regression model is significant. This is indicated by the F-Statistic of 37.29 and the associated p-value of 0.00 which is less than 0.05. This shows that there is a significant relationship between librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery. The null hypothesis is therefore not accepted.

**Table 4: t-test Summary of the Relationship Between Librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.781	.212		3.689	.000		
	Librarians	.404	.066	.416	6.107	.000	1.000	1.000

a. Dependent Variable: Staff readiness

The unstandardized regression coefficient ( $\beta$ ) as indicated in the Table above reveals that a unit increase in the librarians will decrease Staff readiness by .40. It further reveals that there is a direct relationship between librarians and Staff readiness of workers. The t-value of 6.11 and the associated p-value of .001 ( $p=.001<.05$ ,  $t=6.11$ ) indicated that there is a positive and significant relationship between the librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery. The collinearity statistics in the coefficient table shows that there is no evidence of multicollinearity as indicated by the tolerance value of 1.00 which is greater than the cut-off point of .10 and supported by the Variance Inflation Factor (VIF) value of 1.00 that is below the cut-off point of 10.

**What is the relationship Between Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery?**

**Table 5: Pearson Correlation Summary of the Relationship between Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery**

		Librarians	Implementation
Librarians	Pearson Correlation		1
	Sig. (2-tailed)		.263**
	N	180	180
Implementation	Pearson Correlation	.263**	
	Sig. (2-tailed)	.000	
	N	180	180

\*\* . Correlation is significant at the 0.05 level (2-tailed).

Result presented in the Pearson correlation summary above shows that there is a positive and weak relationship (+.26) between librarians and implementation in Adoption of Cloud Computing for Effective Services Delivery occupation (Table 5).

**Table 6: Linear Regression Model Summary of the Relationship Between Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.263 <sup>a</sup>	.069	.064	.53920	1.994

a. Predictors: (Constant), Librarians

b. Dependent Variable: Implementation

The linear regression model summary presented above confirmed that there is a positive and weak relationship (+.26) between librarians and implementation in Adoption of Cloud Computing for Effective Services Delivery occupation. The coefficient of determination of .069 shows that only 6.4% change in the implementation is explained by librarians (Table 6). Furthermore, the Durbin-watson value of 1.99 indicated that there is no evidence of autocorrelation as it does not exceed the standard limit of 2.44.

**Hypothesis 2:** There is no significant Relationship Between Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery



**Table 7: ANOVA Summary of the Relationship Between Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery Occupation**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.849	1	3.849	13.240	.000 <sup>b</sup>
	Residual	51.752	178	.291		
	Total	55.601	179			

a. Dependent Variable: Implementation  
 b. Predictors: (Constant), Librarians

The ANOVA result shows that the overall regression model is significant. This is indicated by the F-Statistic of 13.24 and the associated p-value of 0.00 which is less than 0.05. This shows that there is a significant relationship between librarians and implementation in Adoption of Cloud Computing for Effective Services Delivery occupation (Table 7). The null hypothesis is therefore not accepted.

**Table 8: t-test Summary of the Relationship Between Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery Occupation**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.692	.107		15.763	.000		
	Librarians	.145	.040	.263	3.639	.000	1.000	1.000

a. Dependent Variable: Implementation

The unstandardized regression coefficient ( $\beta$ ) as indicated in the Table 8 above reveals that a unit increase in the librarians will increase Implementation by .15. It further reveals that there is a direct relationship between librarians and implementation. The t-value of 3.64 and the associated p-value of .001 ( $p=.001 < .05$ ,  $t=3.64$ ) indicated that there is a positive and significant relationship between the librarians and implementation in Adoption of Cloud Computing for Effective Services Delivery occupation. The collinearity statistics in the table shows that there is no evidence of multicollinearity as indicated by the tolerance value of 1.00 which is greater than the cut-off point of .10 and supported by the Variance Inflation Factor (VIF) value of 1.00 that is below the cut-off point of 10.

**Research Question 3:** What is the Relationship among Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery

**Table 9: Pearson Correlation Summary of the Relationship among Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery**

		Librarians	Operation service	Applied operation
Librarians	Pearson Correlation	1	.491**	.416**
	Sig. (2-tailed)		.000	.000
	N	180	180	180
Operation service	Pearson Correlation	.491**	1	.263**
	Sig. (2-tailed)	.000		.000
	N	180	180	180
Applied operation	Pearson Correlation	.416**	.263**	1
	Sig. (2-tailed)	.000	.000	
	N	180	180	180

\*\* . Correlation is significant at the 0.05 level (2-tailed).

Pearson correlation summary presented in Table 9 shows that there is a positive and moderate relationship (+.49) between Librarians and Operation service, positive and moderate relationship (+.42) between Librarians and Applied operation, and positive and weak relationship (+.26) between Operation service and applied operation in in Adoption of Cloud Computing for Effective Services Delivery (Table 9).

**Table 10: Linear Regression Model Summary of the Relationship among the Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.422 <sup>a</sup>	.178	.168	.50822	2.003

a. Predictors: (Constant), Librarians, Operation service  
 b. Dependent Variable: Applied operation

Table 10 confirmed the positive and moderate relationship (+.42) among the Librarians, Operation service and applied operation in Adoption of Cloud Computing for Effective Services Delivery as contained in

the linear regression model table. The coefficient of determination (R Square) of .178 shows that 17.8% change in the applied operation of Adoption of Cloud Computing for Effective Services is jointly explained by Librarians and Operation service . The Durbin-watson value of 2.003 shows there is no evidence of autocorrelation (Table 10).

**Hypothesis 3:** There is no significant Relationship among the Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery

**Table 11: ANOVA Summary of the Relationship among the Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.885	2	4.942	19.135	.001 <sup>b</sup>
	Residual	45.716	177	.258		
	Total	55.601	179			

a. Dependent Variable: Applied operation

b. Predictors: (Constant), Librarians, Operation service

Table 11 indicated that there is a statistically significant relationship among the Librarians, Operation service and applied operation in automobile technology as indicated by the F-value of 19.14 and the corresponding p-value of .001 which is less than .05. The hypothesis of no significant relationship is therefore not accepted.

**Table 12: t-test Analysis of the Relationship among the Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.791	.212		3.730	.001		
	Operation service	.043	.043	.077	.990	.323	.759	1.317
	Librarians	.367	.076	.378	4.834	.001	.759	1.317

a. Dependent Variable: Applied operation

A unit increase in the Librarians will decrease applied operation of worked by .37 while a unit increase in Operation service will increase applied operation by .04 (Table 12). The table further revealed that no statistically significant relationship existed between Operation service and applied operation (p-value=.32>.05, t=.99) while a statistically significant relationship (p=.001<.05, t=4.83) was found between Librarians and applied operation in Adoption of Cloud Computing for Effective Services Delivery. The collinearity statistics in the table shows that there is no evidence of multicollinearity as indicated by the tolerance value of .76 which is greater than the cut-off point of .10 and supported by the Variance Inflation Factor (VIF) value of 1.32 that is below the cut-off point of 10.

## II. Findings of the Study

From the data collected and analyzed, the following findings were made:

1. There was a positive and moderate relationship (+.42) between Librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery
2. A statistically significant relationship (P=.000<.05, F=37.29) was found to exist between Librarians and Staff readiness in Adoption of Cloud Computing for Effective Services Delivery
3. There was a positive and weak relationship (+.26) between Librarians, Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery occupation.
4. There was a significant relationship (p=.000<.05, F=13.24) between Librarians and Operation service and Applied operation in Adoption of Cloud Computing for Effective Services Delivery
5. There was a positive and moderate relationship (+.49) between Librarians and Implementation, positive and moderate relationship (+.42) between Librarians and Operation service and positive and weak relationship (+.26) between Librarians Applied operation and Implementation in Adoption of Cloud Computing for Effective Services Delivery.
6. There was a statistically significant relationship (p=.001<.05, F=19.14) among the Librarians and Implementation in Adoption of Cloud Computing for Effective Services Delivery.

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