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Cloud Computing Application for accessing E-resources by University Librarians: Case Study of University Librarians in Niger Delta Region.

Vincent Osamuyimen Ekhaguosa
Igbinedion University, Okada, vekhaguosa@iuokada.edu.ng

Gladys Otasowie Otote
Igbinedion University, Okada, gladysronson4444@gmail.com

Mary Irughe
Igbinedion University, Okada, marymayirughe@gmail.com

Efosa Egharevba
Igbinedion University, Okada, efosaegharevba123@gmail.com

Blessings Amina AKPORHONOR,
Delta State University, Abraka, baakporhonor@delsu.edu.ng

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By

EKHAGUOSA, O. Vincent, OTOTE, O. Gladys, IRUGHE Mary, EGHAREVBA Efosa,
Igbinedion University, Okada
Edo State, Nigeria.
vekhaguosa@iuokada.edu.ng +2347030122622, gladysronson4444@gmail.com
+2348145847927, marymayirughe@gmail.com +2348056735136,
efosaegharevba123@gmail.com +2347033861451

&

AKPORHONOR, Blessings Amina (Ph.D.)
Library and Information Science, Delta State University, Abraka.
Delta State, Nigeria
Email: bakporhonor@yahoo.com
+2348035058247

Abstract

Cloud Computing Application for accessing E-resources by University Librarians: Case Study of University Librarians in Niger Delta Region. Abstract This study investigated cloud computing applications for accessing e-resources by Librarians in university libraries in Niger Delta Region, Nigeria. In this study, the descriptive research design was adopted, and 43 items self-structured questionnaire was used to collect data. In the selection of the university libraries, the researcher used the stratified random sampling technique to select the university libraries. One hundred and fifty (150) librarians from the nine (9) the Niger Delta States were selected from three (3) centrally located states which include Delta, Bayelsa, and Edo as the target population was four hundred and thirty-two (432) librarians. Data collected were analyzed using frequency tables and percentages. The findings discovered that librarians in university libraries in Niger Delta use applications of cloud computing. Regarding librarians' response to the question of librarians' cloud computing applications, the majority of librarians agreed that they use cloud computing applications to access, store and share e-resources. In addition, a strong recommendation was made that Institutions and governments should provide internet and, facilities for effective and efficient cloud computing applications in accessing e-resources.

Keywords: Cloud Computing, cloud applications, Cloud Computing Technology, Cloud Computing Models, Information and Communication Technology, Librarians, University Libraries, Niger Delta

Introduction

In the twenty-first century, the library has to perform many challenging roles in addition to the

traditional library services (Dhanavandan and Tamizhchelvan 2014).

Due to the technological innovation in teaching and learning activity, the university library is adopting new challenges by taking care of applying information and communication technology by way of Initiating digitalization, developing an institutional repository, training library personnel to cope-up with the challenges from technology, and providing up to date content to its users. The library is dealing with many advanced operations and their resources are available not only in print format but also in many resources procured, processed, and disseminated in digital or electronic format in-network or cloud environment (Mohsenzadeh, and Isafanyari-Moghaddam, 2009). Libraries worldwide are digitizing materials and offering full-text documents or images to clientele via their websites and Compact Disc Read-Only Memory (CD-ROM).

Digital collections usually consist of content in the local database and provide unlimited access to materials that are not readily accessible. Electronic Resources (e-resources) are an enhancement of information and communication technology (ICT). It becomes popular or more effective with the coming of the Internet and its rapid growth. Electronic resources are concepts that evolved as a result of the rapid growth of information and communication technology. It has been described by various authors in different ways. Shukla and Mishra (2011) The significant application of cloud computing in the university library where library content can be used and transformed with different universities can help in maximum and operational utilization of library resources with the help of depiction data and software application. Cloud computing is beneficial for building up a digital library, storing files, creating community, and expanding library automation (Breeding, 2012) Application of cloud computing technology n university libraries has numerous benefits; mainly improving computing performance, increasing storage capacity, cultivating global accessibility of library content and can reduce the operational cost in Information Technology investment.

OBJECTIVES OF THE STUDY

The study generally investigated cloud computing applications for accessing e-resources by librarians in university libraries in the Niger Delta Region, Nigeria. Specifically, the study set out to:

1. Find out how cloud computing applications are used by Librarians in university libraries in Niger Delta Region, Nigeria
2. find out the cloud computing applications used by Librarians in university libraries in Niger Delta Region, Nigeria
3. explore the e-resources are accessed through cloud computing applications by librarians in University Libraries
4. know the databases e-resources are accessed through cloud computing applications by Librarians in University Libraries in Niger Delta Region, Nigeria
5. determine the benefits of accessing e-resources through cloud computing applications by Librarians in University Libraries in the Niger Delta Region, Nigeria?

Significance of the Study This study will help librarians to acquire and improve their cloud computing application knowledge efficiently in data access, usage, and sharing.

Review of Related Literature

CONCEPTUAL OVERVIEW OF CLOUD COMPUTING

In simple terms cloud computing is a substitute for the internet. In recent times, many institutions and organizations are using cloud services by uploading projects on a cloud-based server on the internet in an extensively disseminated environment. Cloud computing is also known as "software as a service", the internet as a platform", "on-demand computing" and "information utilities" (Hayes, 2008). According to the National Institute of Standards and Technology (NIST), (2011), "cloud computing is a model for enabling ubiquitous, 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. "One way to think of cloud computing is to consider your experience with email. Your email client, if it is Yahoo, Gmail, Hotmail, and so on, takes care of housing all of the hardware and software necessary to support your email account. When you want to access your email, you open your web browser, go to the email client, and log in. The most important part of the equation is having Internet access, and you can access it anywhere." (Apkorhonor & Ekhaguosa, 2021). This cloud model is composed of five

essential characteristics, three service models, and four deployment models" (Sivakumar & Singaravelu, 2016), According to Kaushik and Kumar (2013), two models are working for cloud computing which are Deployment Models and Service Models. Cloud Deployment Models: Deployment models define the types of access to the cloud i.e. how the cloud is located. Cloud can have any of the four types of access- 1) Public Cloud. 2). Private Cloud. 3). Hybrid Cloud. 4) and Community Cloud while Cloud Service models: are- (1) Infrastructure as a service (IaaS) (2) Platform as a Service (PaaS) (3) and Software as a Service (SaaS). Deployment Models: Currently, four types of cloud deployment models have been defined in the cloud community: Private Cloud is a deployment model solely developed and managed by a single organization or a third party regardless of whether it is on-premise or off-premise. Community Cloud is a joint venture of several organizations that come together to build a cloud infrastructure as well as policies through which cloud services will be rendered. The public cloud is meant for general public use and it is open to all. This kind of deployment model of cloud computing is developed by any cloud computing agency, and having own policy, value, and profit, costing, and charging model. Some popular public cloud services include Amazon EC2, $3, Google App Engine, and Force. A hybrid Cloud is made from more than one cloud deployment models that may be public, private, community, and other models also, bound together with standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds). Service Description model: Software as a Service (SaaS). This is the capability provided to the consumer to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices either through a thin client interface, such as a web browser (e.g., web-based email), or a program interface. Platform as a Service (PaaS). This is the capability provided for the consumer which is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. Infrastructure as a Service (laaS). The capability provided to the consumer is to make provision for processing, storage, networks, and other fundamental computing resources where the consumer can deploy and run arbitrary software, which can include operating systems and applications.

Cloud applications have assumed an important role since their implementations to the extent that scholarly journals and the software that provides access to these contents are more frequently cloud-based. Missions of libraries are now being fulfilled and manifested by the presence of

cloud-based solutions due to its support and facilitation of online electronic resources and services provided (Nagalakshmi, 2013; Madhusudhan, 2013). Some of the top cloud apps for android phones and tablets comprise dropbox drive, sugar sync, amazon cloud drive, and google drive (freemake.com 2010). Some of the heavily used Cloud computing applications are Gmail, Yahoomail, Skydrive, Idrive, Google Docs YouTube, Social networking Facebook, etc. In this information and technology age, libraries need to provide services that run on the media used by the library users, such as mobile phones, smartphones tablets, laptops, and personal computers (PC). The Cloud computing paradigm is independent of location and can be accessed on any media having network connectivity and browsers. A lot of researchers have analyzed the use of mobile smartphones to access cloud-based services accessed via web browsers.

Benefits of cloud computing

A Cloud system as emphasized by Gartner (2015) in Romero (2012) is the ability to reuse, the economy of resources, and maximization of utilities through reduced cost associated with waste of resources, management and maintenance of physical facilities and reinvestment of available funds to optimal services provision. Increased Storage: With the massive Infrastructure that is offered by Cloud providers today, storage and maintenance of large volumes of data is a reality. Sudden workload spikes are also managed effectively & efficiently since the cloud can scale dynamically.

Yuvaraj (2013) and Tritt and Kendrick (2014) observed that some libraries have jumped and are increasingly stepping into the realm of digital librarianship as well as platforms that extend information technology obtainable capabilities, and this at length depends on using the cloud facilities. Notably, most libraries deploy computer systems that are built on a pre-web technology. Systems spread across the web using pre-Web technology are harder and costlier to incorporate together. Reduced Cost: There are several reasons to attribute Cloud technology with lower costs. The billing model is pay as you use; the infrastructure is not purchased thus lowering maintenance.

The initial expense and recurring expenses are much lower than in traditional computing. Das (2013) accorded that cloud computing technology infrastructures can help educational institutions, especially universities, open their massive research endeavours to businesses and industries for research advancements.

Questionnaire Response Rate

Table 1: Questionnaires Response

Number of Questionnaires Administered	Number of Questionnaire Returned	Percentage of Questionnaire Returned
150	131	87%

A total of 150 copies of the questionnaire were distributed and 131 (87%) copies were returned. The response rate of (87%) is considered adequate for the study. This is because according to Dulle, Minish-Majanja and Cloete (2010) the standard and acceptable response rate for most studies is 60%.

Research Question One: how do librarians uses cloud computing application for e-resources in University Libraries?

Table 2: Librarians uses cloud computing applications for e-resources.

Librarian uses cloud computing applications	SA	A	D	SD	Mean	St.D
Cloud Computing Applications	61	35	35	0	3.20	.84
Access E-Resources	48	44	39	0	3.10	.82
Store E-Resources	48	35	48	0	3.00	.86
Share E-Resources	57	0	74	0	3.44	.50
Aggregate Mean/SD					3.18	0.17
Criterion Mean					2.50	

NOTE: Strongly Agree (SA), Agree (A), Disagreed (D) Strongly Disagreed (SD), Standard Deviation (St.D)

Table 2 represents responses to librarian use of cloud computing applications. The aggregate mean of 3.18 which is greater than the criterion means of 2.50 shows that librarian uses cloud computing applications in accessing e-resources Concerning librarians' response to the question of cloud computing application, the respondents agreed that they use cloud computing

applications (3.20) to access e-resources, while the respondents can access, store and share e-resources given their following mean (3.10, 3.00 and 3.44) respectively. Thus, it can be concluded that the Librarians in university libraries use cloud computing applications.

Research Question Two: What are the cloud computing applications for accessing e-resources by Librarians in University Libraries?

Table 3: Cloud applications for accessing e-resources

Cloud computing applications for accessing e-resources	SA	A	D	SD	Mean	St.D
I can access e-resources from Google Drive	40	52	35	4	2.98	.84
I can access e-resources from the IPhones Cloud	44	17	70	0	2.80	.92
I can access e-resources from DropBox	79	13	31	8	3.24	1.02
I can access e-resources from Facebook	73	58	0	0	3.56	.50
I can access e-resources from email	40	44	8	39	2.65	1.20
I can access e-resources from AmazonS3	53	26	52	0	3.01	.90
I can access e-resources from Mega	56	42	8	25	2.98	1.12
Aggregate Mean/SD					3. 03	0.23
Criterion Mean					2.50	

Table 3 shows that with an aggregate mean of 3.03 which is more than the criterion mean of 2.50, it can be deduced that librarians can access e-resources from cloud computing applications. However, the most commonly used application to access e-resources from cloud computing was Facebook (3.56), followed by Amazon S3 (4.57) while Email 2.65 was the least used to access e-resources. This may not be far-fetched that respondents are not aware that Email can be used to store data.

Research Question Three: What e-resources are accessed through cloud computing by librarians in University Libraries?

Table 4: E-resources accessed through cloud computing applications

e-resources accessed through cloud computing	SA	A	D	SD	Mean	St.D
E-Journals	58	47	26	0	3.24	.77
E-Books	62	21	48	0	3.12	.91
Full-text Database	47	31	53	0	2.95	.88
Indexing and Abstract Database	66	48	17	0	3.37	.71
Reference Database	67	12	62	0	3.11	.95
E-Dictionaries	54	25	52	0	3.02	.90
E-Directories	39	75	17	0	3.20	.63
E-Encyclopeadia	54	33	44	0	3.07	.86
Numerica and Statistical	48	53	30	0	3.15	.77
E-Images	57	74	0	0	3.44	.50
E-Audio/Visual	53	4	74	0	2.84	.98
Aggregate Mean/SD					3.14	0.15
Criterion Mean					2.50	

Table 4 shows that librarians in the Niger Delta region agree that they access e-resources through cloud computing considering that the aggregate mean of 3.14 is greater than the criterion means of 2.50. It is evident that out of the numerous e-resources listed above, E-images are.44) is mostly accessed. Others also mostly accessed are E- Indexing and Abstract Database (3.37), E-journals (3.24), E-directories (3.20), etc. the likely reason for this is that they are the most commonly used by librarians for reference purposes while E-Audio/Visual is least used.

Research Question Four: What databases e-resources are accessed through cloud computing by Librarians in University Libraries in Niger Delta Region, Nigeria?

Table 5: Databases e-resources are accessed through cloud computing

databases e-resources are accessed through cloud computing applications	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	Mean	St.D
Google Scholar	40	78	13	0	3.21	.60
Ebscohost	51	67	13	0	3.29	.64
Jstor	75	35	21	0	3.41	.75
DOAJ	67	39	21	4	3.29	.85
DOAB	43	35	53	0	2.92	.86
Research Gate	43	35	53	0	2.92	.86
Academia edu	51	23	57	0	2.95	.91
Youtube	25	93	13	0	3.09	.53
OPAC	53	62	16	0	3.28	.67
Research4life	39	92	0	0	3.30	.46
Institutional E-Repository	0	48	39	44	2.03	.84
Aggregate Mean/SD					3.06	0.15
Criterion Mean					2.50	

Table 5 above shows that the librarians access e-resources from listed databases with an aggregate mean of 3.06 which is more than the criterion means of 2.50, it can be concluded that Librarians in University libraries access e-resources databases through cloud computing. The most accessed databases were the Jstor (3.41), Research4life (3.30) Ebscohost (3.29), DOAJ (3.29), and OPAC (3.28) respectively. Institutional E-Repository (2.03) was less than the criterion mean of 2.50. it can be deduced from the above that the respondents are not well informed or the awareness level of their institutional e-repository is low.

Research Question Five: What are the benefits of accessing e-resources through cloud computing applications by Librarians in University Libraries in the Niger Delta Region, Nigeria?

Table 6: Benefits of accessing e-resources through cloud computing applications by Librarians

Benefits of accessing e-resources through cloud computing applications by Librarians	Strongly Agreed	Agreed	Disagreed	Strongly Agreed	Mean	Std.D
Accuracy	76	34	21	0	3.43	.75
Currency	49	43	39	0	3.08	.82
Search Ability	29	89	13	0	3.12	.56
Full-text Retrieval	29	89	13	0	3.12	.56
Convenience	79	43	9	0	3.53	.62
Link to Related Items	39	79	13	0	3.20	.60
Credibility	66	21	44	0	3.17	.90
Prompt Access	43	75	13	0	3.23	.61
Multiuser Access	48	57	26	0	3.17	.72
User-friendly Interface	69	62	0	0	3.53	.50
Aggregate Mean/SD					3.26	1.21
Criterion Mean					2.50	

Table 6 above shows that there are lots of benefits derived from accessing e-resources through cloud computing with the aggregate mean of 3.26 which is greater than the criterion means of 2.50. All respondents agreed to have benefited from cloud computing access to e-resources. The majority of respondents' benefits derived from accessing e-resources through cloud computing are convenience to access e-resources (3.53), and user-friendly interface (3.53). Prompt access (3.23), Link to Related Items (3.20), Credibility (3.17), and Multiuser Access (3.17) were also benefits derived. This implies that librarians benefit very much from accessing e-resources through cloud computing. This finding confirms that Okoye and Ejikeme (2010) that stated, articles can be accessed online free of charge and that the advantage of open access journals is that the entire content is available to users everywhere.

Discussion of the Findings

This study seeks to explore cloud computing applications for accessing e-resources by librarians in University Libraries in Niger Delta Region, Nigeria. This was achieved quantitatively with the use of questionnaires. The findings discovered that librarians in University Libraries in Niger Delta have used cloud computing applications. Concerning librarians' responses majority of librarians agreed that they use cloud computing applications to access e-resources, store e-resources, and share e-resources. All the librarians access the Skydrive cloud, and the majority of librarians access e-resources from the Google drive application, drop Box while many also disagreed with access from the iPhone cloud which might be a result of less use of iPhones and the cost of iPhones. The iPhone cloud is only accessible to iPhone users.

Findings also show that librarians in the Niger Delta region access e-resources out of the numerous e-resources listed, E-Images were agreed to be accessed by the entire librarians while many disagreed with accessing e-audio/visual resources from cloud computing which might be too much data consumption. Also, Database e-resources are accessed through cloud computing applications. All librarians access Research4life due to institutional subscription, they access to youtube, Google scholar, Ebscohost, respectively, OPAC, Jstor, DOAJ, DOAJ, research gate Academia Edu. There was a degree of disagreement regarding the database of institutional repositories which may be due to a lack of awareness of their institutional repository.

The study shows that there are lots of benefits derived from accessing e-resources through cloud computing applications with an aggregate mean of 4.4. the respondent noted that the major benefit derived was the user-friendly interface of the cloud computing application followed by the convenience, full-text retrieval, link to related items, and prompt access respectively. This finding strongly confirms that of Okoye and Ejikeme (2010) that stated that articles can be accessed online free of charge and that the advantage of open access journals is that the entire content is available to users everywhere.

Conclusion

It can be concluded from the findings that Librarians in University libraries in the Niger Delta region of Nigeria uses cloud computing applications and can access e-resources through them. It was discovered that Librarians in University libraries in the Niger Delta region of Nigeria can

access e-resources from Google drive, dropbox, and more of Facebook while many do not use the iPhone cloud. E-images from the cloud were most used in all the e-resources accessed. E-resources were accessed from home and offices than the library from their laptops, android phones, and desktops from the cloud. Research4life was the most used database and the institutional e-repositories were not mainly accessed may be due to the non-availability of institutional e-repository or lack of awareness. The benefits derived from e-resources accessed from cloud computing applications include a user-friendly, convenient link to related items, credibility, prompt access, and it is multiuser access.

Recommendations

Based on the findings of this study, the following recommendations are hereby made:

i. Librarians should be assisted and encouraged to develop technical, social media, and computer literacy skills to enhance their search ability.

ii. Institutions and governments should provide internet and ICT facilities for all for effective and efficient cloud computing in accessing e-resources.

iii. Libraries should subscribe to e-resources and organize and grow their institutional e-repository to improve teaching and learning in the institutions

iv. Libraries should have a strong network and bandwidth to access e-resources and to provide better automated services.

v. Libraries should have an ICT center to support users that cannot afford the necessary facilities to access e-resources.

vi. Governments and institutions Authorities should organize seminars, workshops, and training regularly for librarians to keep them updated on new trends in ICT and librarianship.

5.4 Contribution to the knowledge

The study contributes to knowledge in the following ways:

i. The study established that Librarians in University libraries in Nigethe r Delta region of Nigeria uses used computing and its applications to access e-resources

ii. The study established that Librarians in University libraries in the Nigethe r Delta region of Nigeria have a positive attitude towards cloud computing to access e-resources.

iii. The study has revealed that numerous databases can be accessed anytime, anywhere as long as there are internet-enabled devices.

iv. The study affirms that Librarians in University libraries in the Niger Delta region of Nigeria found out that cloud computing is user-friendly and convenient.

REFERENCE

Apkorhonor, B. A. & Ekhaguosa, V.O.,(2021). Cloud computing knowledge by librarians in university libraries in Niger Delta region, Nigeria, *Delsu Journal of Educational Research and Development,* 18(1), 20-30

Breeding, M. (2012). Cloud computing for Libraries. Chicago: *ALA Tech source,* 1–8

Dhanavandan, S. and Tamizhchelvan, M. (2014). Role of Information Technology in Academic Libraries: Personal Computer to Cloud Computing. *International Journal of Advanced Library and Information Science,* 2(1), 62-71

Dulle, F. W., Minish-Majanja, M. K. & Cloete, L. M (2010). *Factors influencing the adoption of open scholarly communication in Tanzania public universities.* Paper presented at the World Library and Information Congress: 76th IFLA General Conference and Assembly. Gothenburg, Sweden. Retrieved from the International Federation of Library Association website; http://www.ifla.org/flies/hq/papers/ifla76/138-dulle-en.pdf

Hayes, B. (2008). Cloud computing. *Communications of the ACM*, 51 (7), 9-11

https://www.amnesty.org/en/latest/news/2018/03/niger-delta-oil-spills-decoders/(May 10, 2021)

Kaushik, A., & Kumar, A. (2013). Application of cloud computing in libraries. *International Journal of Information Dissemination and Technology, 3(4),* 270-273.

Madhusudhan, M. (2008). Use Infonet – journals by the research scholars of University of Delhi", *Library Hi Tech, 26(3)*. 369 – 386.

Mohsenzadeh, F. and Isafanyari-Moghaddam, A. (2009). Application of information technologies in academic libraries. *The Electronic Library*, 27(6), 986-998

Nagalakshmi L. R. (2013). Application of cloud computing library and information centers. *Research Journal of Science & IT Management (***RJSITM***) 2(5),* 43–46.

National Institute of Standards and Technology, (2011). National Institute of Standards and Technology 2–3

Okoye, M. O., & Ejikeme, A. N., (2011). "Open Access, Institutional Repositories, and Scholarly Publishing; The Role of Librarians in South Eastern Nigeria."Library Philosophy and Practice (e-journal). 612. https://digitalcommons.unLedu/libphilprac/612

Romero N.L. (2012). Cloud computing in library automation: benefits and drawbacks. The Bottom Line: *Manag. Libr. Finan. 25(3)*:110-114.

Sivakumar, A., & Singaravelu, G. (2016). Utilization of cloud computing applications. *American Journal of Educational Research*, *4(11),* 792-797.

Tritt D, Kendrick K.D. (2014). Impact of cloud computing on Librarians at small and rural Academic libraries. *The Southeastern Librarian 62(3),* 1-33.

Yuvaraj, M. (2013). Cloud computing applications in Indian central university libraries: A study of librarians use. Library *Philosophy and Practice (E-Journal),* (992).