

Full Length Research

Analyzing the Need for Cloud Computing Adoption in Nigerian Academic Libraries for Effective Service Delivery

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Information explosion coupled with an estimated number of information seekers made libraries across the globe to embrace the use of ICT in delivering their services to the users. ICT have been undergoing changes primarily to fulfill the demand of its users. One of such changes in ICT is the invention of cloud computing, which is the delivery of computing services—servers, storage, databases, networking, software, analytics, intelligence and more—over the Internet. This technology can surely help libraries to ensure efficient service delivery at a much reduced cost. However, literature review indicated that the rate at which the cloud computing is adopted in Nigerian academic libraries became a topic of discussion as most of the libraries have not reach an advance stage of adopting the technology despite the numerous benefits in terms of scalability, elasticity, virtualization, cost reduction and collaboration it offers to its adopters. It is in line with the afore mentioned that this paper aims at analyzing the need for cloud computing adoption in academic libraries for effective service delivery. The paper reviewed recent, related and relevant literature all in an attempt to get other previous authors views about the adoption of cloud computing in Nigerian academic libraries. The synthesized literature revealed that most librarians have little knowledge about cloud computing and its unlimited benefits which could be the reason among others why there is less adoption of such technology. The paper recommended that there is a need for librarians to put more effort to explore other benefits of cloud computing so that they became knowledgeable enough about it and its benefit. The paper also recommended that authority concern should provide all the necessary support required for the full adoption of cloud technology in Nigerian academic libraries

Key words: Cloud computing, Academic Libraries, Effective Library Service

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INTRODUCTION

Provision of effective library services rely so much on the information and communication technology (ICT) expansion. The in- cooperation of ICT in the services provided by our libraries arose some number of challenges and opportunities to information professionals, librarians as well as users (Jaeger, Lin, Grimes & Simmons, 2009). Adoption of modern technology may likely influence the teeming users of the libraries to form part of the reality of present globe and the digital society. Neglecting the adoption of such technology will make it difficult for societies and education to fully associated (Aminu & Haruna, 2015). Singh and Kaur (2000) noted that the main mandate of academic libraries is to preserve and provide access to required knowledge and information, thereby supporting teaching and research which is the mission of their parent institutions. However, developing countries are realizing the implication of the digital divide (the divide or gap between those with access to new ICTs and those without) and are now trying to adopt the new technologies as necessary for discharging their mandate.

Cloud computing is the third revolution in the world of ICT after invention of personal computers and internet. Madhubala (2012) put forth her view that "Cloud computing is a paradigm that focuses on sharing data and computations over a scalable network of nodes". It is a mode of computing where ICT related capabilities are provided as a service that enables the users to have access to such shared capabilities. Richard and Ahmed (2013) further attested that in cloud computing, data and services are placed in a very large scalable data centers located on the cloud and access is granted to all eligible users through their respective browsers.

Information is exploring in a very rapid trend in this technological era and information needs of users are also rising in ever fasting mode. To meet the demand of peculiar information needs of the knowledge society, adopting a new technology such as cloud computing for efficient service delivery is inevitable. According to Matt (2010) Cloud computing can change the trend in which systems are built and services are offered, therefore Libraries can have more opportunity to extend their impact beyond the present stage.

However, considering the number of academic libraries we have in our dear country Nigeria, it will be costly and probably impossible for each of such library to own and maintain their individual ICT like cloud computing. Haruna, Abubakar, Umeh & Mubarak (2017) acknowledged that huge amount of money have been spent by many libraries on computing and telecommunication facilities as well as their supporting software packages. Apart from that, a huge amount of money will be likely required to hire /employ ICT professionals to coordinate, control and maintain the

deployed cloud computing. Therefore cloud computing may be the solutions to libraries. Haruna , Abubakar, Umeh & Mubarak (2017) further stress that cloud computing is on board to further revolutionize the trend in which many organizations deliver their services of which academic libraries are not in exception, many academic libraries that are less privileged will benefits from the potentialities of cloud computing deployment at a very low cost and/ or pay per use mode.

Nilratan and Sriparna (2013) explained that Cloud computing is capable of bringing together collection of documents and resources stored in various personal computers, personal server and other equipment in to one place and putting them on the cloud for the use of the user community. This is in line with Richard and Ahmed (2013) who maintained that Cloud computing is an approach means for providing divers set of services on virtual system allocated on top of a huge physical pool which reside in the cloud, in other words, cloud computers is capable of obtaining vast amount of information and resources stored in personal computers, mobile phones and other ICT related facilities, incorporated and place them on the cloud for serving users. In view of that, there is likely serious need for integrating our library services with cloud computing in order to ensure cost minimization and greater efficiency in service delivery.

Therefore this study aims at analyzing the need for the adoption of cloud computing in academic libraries for effective service delivery that can support and satisfy the information needs of our teeming library users at a very cheaper rate.

LITERATURE REVIEW

Concept of Cloud Computing

Cloud computing is the latest revolution in the field of information and communication technology (ICT), as it bring some an imaginable services that ease peoples transactions and extremely enhance effective services delivery. Cloud computing is nothing more than provision of cloud services - servers, storage, databases, networking, software, analytics and more - over the Internet ("the cloud"). Companies that are responsible of providing such services are called cloud providers and are typically charging their client for service provision based on usage just like how we are billed for water or electricity in our homes (Microsoft Azure, 2019). Foster, Zhau, Ioan, and Lu (2008) defined Cloud computing as "a large-scale distributed computing paradigm that is driven by economies of scale, in which a pool of abstracted, virtualized, dynamically-scalable, managed computing

power, storage, platforms, and services are delivered on demand to external customers over the internet.” Cloud computing could be made public in such a way that resources will be provided to users as a services on a specified fee, mostly over an internet connection; or private in which the organization can deploy the cloud in to its firewall and personally manage it. Grace (2010) ascertains that the major reasons for adopting cloud computing are scalability, elasticity, virtualization, cost reduction, mobility, and collaboration and risk reduction; however, performance, control, interoperability and security are the primary concern of most organizations.

Librarians find cloud computing as helpful enough in protecting and preserving their data and privacy. Libraries adopt cloud technology for easy access to e journals, hosting sister digital libraries tracking of statistical data among others (Suman & Parminder, 2016). In cloud computing, shared resources, software, and information are provided to remote clients over a network. Cloud computing is a service, wherein cloud resources are dynamically allocated to multiple users as per demand. . Gireesh, Pradeep, Gaurav, Pooja and Gunjan (2011). Perceived that cloud computing is the enhancement of grid computing, distributed computing, distributed databases and parallel computing. Suciu, Halunga, Apostu, Vulpe and Todoran (2013) conceptualized cloud computing as a service on demand that ensure community of end users with a safe computing and storage capabilities for efficient service delivery. They authors further stress that by bringing together user data, software and on-demand computation resources over a network, cloud computing goes beyond the concept of IT services (Figure 1)

Service Models and Features of Cloud Computing

Several number of services are being underpinned by cloud computing. Such services include but not limited to Gmail or the cloud back- up of photos on our various phones. Cloud computing is becoming the default option for many applications, software vendors are increasingly offering their applications as services over the internet rather than standalone products as they try to switch to a subscription model. A fundamental concept behind cloud computing is that the location of the service, and many of the details such as the hardware or operating system on which it is running, are largely irrelevant to the user. It's with this in mind that the metaphor of the cloud was borrowed from old telecoms network schematics, in which the public telephone network (and later the internet) was often represented as a cloud to denote that the underlying technologies were irrelevant Matt (2010)

Microsoft Azure (2019) explain that cloud computing can be classify base on three computing models. Infrastructure as a Service (IaaS) which has to do with

renting of physical or virtual servers, storage facilities, operating system and networking capabilities from a cloud provider on a pay-as-you-go basis; Platform-as-a-Service (PaaS) refers to cloud computing services that supply an on-demand environment for developing, testing, delivering and managing software applications. PaaS is designed to make it easier for developers to quickly create web or mobile apps, without worrying about setting up or managing the underlying infrastructure of servers, storage, network and databases needed for development; Software-as-a-Service (SaaS) is a method for delivering software applications over the Internet, on demand and typically on a subscription basis. With SaaS, cloud providers host and manage the software application and underlying infrastructure and handle any maintenance, like software upgrades and security patching. Users connect to the application over the Internet, usually with a web browser on their phone, tablet or PC.

Libraries use cloud based SaaS tools as OpenURL resolver, online reference, research guides; PaaS tools as integrated library system, interlibrary loan; IaaS as discovery systems, archives management (Shaw, 2013). (Figure 2)

Benefits of Cloud Computing for Effective Library Service Delivery

Libraries can earn a number of benefits from cloud computing adoption in this information explosion era. Storage capacity, increased computational performance, cost minimization and global accessibility to information resources form part of some benefits derivable from adoption of cloud computing by libraries (Tuncay, 2010). This is in line with the assertion of Grace (2010) who ascertains that scalability, elasticity, virtualization, cost reduction, mobility, collaboration and risk minimization are among the reasons why organizations globally opted for cloud computing in their mandate to deliver efficient services to end users. This can help libraries to have fixed and maintenance cost in their IT investment cheaper and affordable, thereby providing an enabling environment for effective service delivery.

According to Okwoli, Ezra, and Baba (2016) with cloud computing in libraries, all sort of financial wastage on IT investment, careless attitudes of users and technological headaches such as computer virus, system crashes and loss of data will be drastically monitored and avoided. There will likely be a significant improvement when cloud computing is adopted in library services delivery. This is coincided with the view of Spreeuwenberg (2012), who affirms that with the presence of cloud computing, it will be easier and efficient to have access to stored data through several remote devices. This can be usefulness especially with

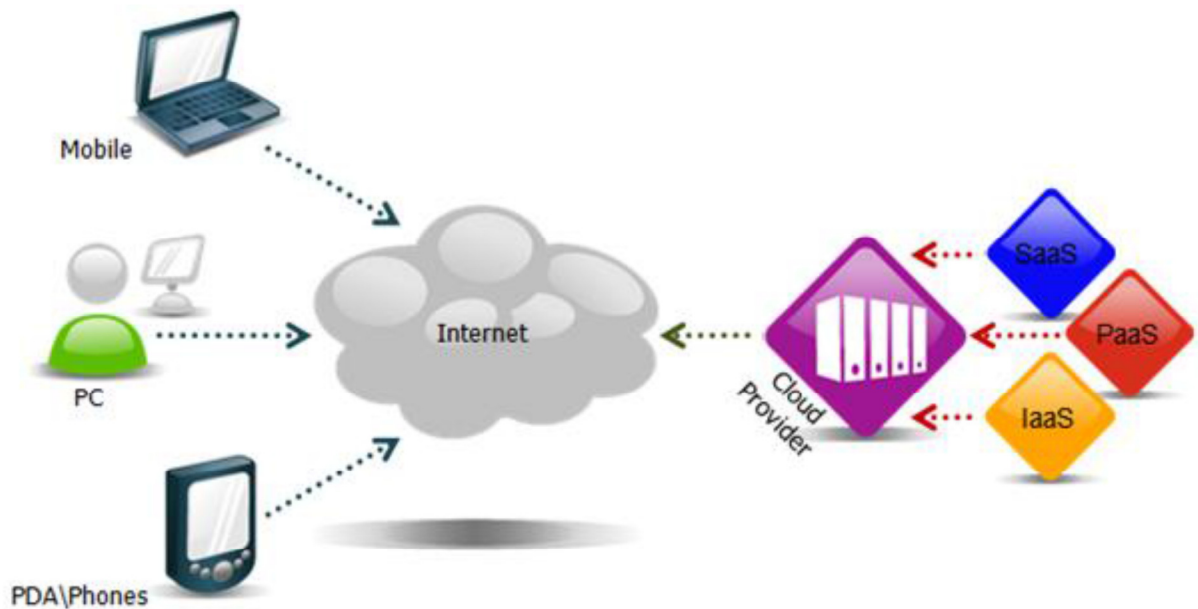


Figure1: Cloud Computing Representation – How it works
Source : Adopted from the work of Raghavendra R. V. and Poornima N. (2017)



Figure 2.Cloud Computing Service Model
Source : Adopted from the work of Kadali S. K. and Devendra C. (2017)

the mobile devices that can only require internet connection. Libraries now a day's vow to provide their

services to client anywhere any time by mounting their services on cloud computing (Okwoli, Ezra, and Baba,

2016). Grant (2012) propounded that with the advent of new technologies, there is need for librarians to get used to such technologies, expand their skills and avails new ideas and approaches to market library services.

The State of Cloud Computing in Nigerian Libraries

Libraries are aligning their activities with cloud computing technology in this information explosion time particularly in an advance country due to number of benefits that are attached to that new technology. African countries particularly Nigeria however are also trying to catch up in ensuring that they adopted the cloud technology adequately. Goldner (2012) maintained that libraries can take advantage of cloud computing services and get rid of all technologically related problems that hinder the smooth running of library services. Breeding (2012) added that libraries can take advantage of cloud computing and put in place important aspect of modern libraries which include building of digital libraries/repositories, facilities for searching library data, hosting website, searching scholarly content, store files and improve library automation.

However, studies have revealed different rate at which cloud computing services are being adopted in most of Nigerian university. Safiya, Mueen, Amad, Raed and Asadullah (2014) acknowledge that computing resources and capabilities became evenly available as a result of popularity and advancement in the ICT, but the level of cloud computing adoption especially in developing countries like Nigeria are still at the very low stage. Ume, Basse and Ibrahim, (2012) added that in developing countries' university like Nigeria, cloud technology adoption is still at the slow rate of adoption likely due to the cost involved in buying and maintaining of ICT facilities and the poor power supply in the country. The situation is more severe in Nigerian context as Omekwu and Echezona (2008) observed that the state of ICT in Nigeria is poor when compared to some Africa countries such as Egypt and South Africa, and ICT gave birth to cloud computing.

Omwansa, Waema and Omwenga (2014) conducted a review on the state of cloud computing adoption among some African countries and eventually discovered that South Africa, Kenya and Nigeria are the countries that have gone far in the use of cloud computing in Sub-Saharan Africa as of the year 2013. They further analyzed the report of a survey carried out by Cisco and World Wide Worx (2013) which found that 50% of South Africa's medium and large businesses were using cloud services, compared to 48% in Kenya and 36% in Nigeria. This is another indication that several initiatives are already in place to adopt cloud computing, but the rate at which the adoption is going in Nigeria is too slow. Idowu and Saheed (2017) concluded that the reality of constant

progress being realized in technology circle has manifested on all professions and particularly library and information science field. Although the startup of latest technology such as cloud computing is still at the very infant stage among academic librarians in Nigeria.

Challenges of Cloud Computing and Reasons for Low Rate of Adoption by Libraries

Up on all the benefits that cloud computing provide, security and confidentiality of stored data, privacy and regulatory compliance, vendor lock-in, location of the data, legal jurisdiction, and reliability of the cloud service provider have been a major aspect of concern by libraries that intends to adopt cloud technology for their services Low, Chen, and Wu (2011). This is in line with the findings of Sultan (2010) who carried out a research at Mellon University and found that the major obstacles with regard to the adoption of technology are confidentiality, privacy, reliability, infancy and novelty of the services provided. Security and privacy of stored data must be subject of concern for most cloud computing adopters, to them any hacking or other forms of attack on the cloud vendor's infrastructure will affect all clients whose data are kept on the infrastructure. Rittinghouse and Ransome (2010) further stress that going against the Service Level Agreement (SLA) by some cloud vendors attributed to some extent the reasons why the level of the adoption by client remain very low. Because failure of cloud vendors to fulfill the requirement of SLA and attend to downtimes prompt needed performance will be negatively affected.

Massadeh and Meslah (2013) In their study on Cloud Computing in Higher Education in Jordan suggested that Jordanian universities consider adopting cloud computing as an avenue of meeting the increased demands of IT services and managing the tight budget due to inadequate financial support from the authorities concern. The researchers believe that implementing cloud computing will be a strategy to put forward excellent business models for the Jordanian universities as they do not have enough resources to manage the required IT support for development, educational, and research activities that should be provided in an ideal higher education environment.

RECOMMENDATION

Though this study is based on review, but the synthesized literature have revealed that cloud computing offers great opportunities to its adopters despite some challenges associated with it. Therefore this study recommended that librarians in Nigeria should explore other benefits of cloud computing and take a serious step toward robbing shoulder with their counterpart in advance

countries in terms of quick adoption of that technology. This is because cloud computing is highly needed considering the information needs of users, explosion of information on daily basis and cost of maintaining individual ICT. Authority concern should also provide all the necessary support and opportunity for all the libraries to adopt cloud computing in their service delivery.

CONCLUSION

Cloud computing is widely known in advance countries by many library professionals and are fully aware about the tremendous benefits it offers. However the adoption of such technology in Nigerian libraries is still at growing stage that something needs to be done in order to accelerate the rate of its adoption so as to grasp the potential benefits attached to it. The challenges that librarians are expecting from the cloud computing is totally nothing when compared with the potential immeasurable benefits it offers to the clients. There is serious need for our librarians to put more effort on how fast they can adopt this technology in order to enhance effective, timely, distance less and efficient services to their teeming users at a reduced and subsidize cost. Therefore, we believe there is still marvelous opportunity for library professionals to make revolutionary contributions in this field, and bring significant impact to their development in the library services.

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