Platform as a Service (PaaS) and Information Service Delivery in Federal University Libraries in South-South and South-East, Nigeria.

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Abstract

This study looked at Platform as a Service and information service delivery in South-South and South-East federal university libraries in Nigeria. To direct the study, one research question was created, and one hypothesis was tested at .05 level of significance. For the study, a descriptive survey design was used, and 117 employees of the institutions under study's who work in the electronic library made up the study's population. Therefore, the study used a census sample method. Data for the study were gathered using a standardised questionnaire called the "Platform as a Service and Information Service Delivery Questionnaire (PSISD)". The data were examined using frequency distribution, percentages, and linear regression. According to the research, Open skies, Serial Solution (ProQuest), Future of Library is Open (FOLIO), Alma/Ex Libris, Online Computer Library Centre (OCLC), Polaris integrated library system, and Ebsco are among the Platform as a Service (PaaS) used in university libraries in South-South and South-East, Nigeria for the delivery of information services. University libraries in South-South and South-East, Nigeria are able to give fast and real-time information services because to the deployment of Platform as a Service. The writers derived and examined the majority of the study's findings and outcomes. This study is unique in the field of cloud computing. As a result, the document will potentially be used as a reference source by library administration, library patrons, researchers, and the wider academic community.

Keywords: Cloud Computing, Platform as a Service, Information Service Delivery, University Libraries

Introduction

Cloud computing, commonly referred as the Fourth Industrial Revolution (4IR) is blurring the lines between the physical, digital and biological spheres and is helping libraries perform operations using third-party services to save costs as well as market information resources and services to library users. Cloud computing has apparently become the most secured and reliable means of information dissemination and has seemingly become the concern of libraries as it plays a critical role in the provision of real time information to library users (Ezenwoke and Igbekele, 2019). It emerged from the evolution of specific elements in the form of technological innovations such as virtualization, data centre automation and high-performance networks. One cloud computing service useful in academic libraries is Platform as a Service (PaaS).

Platform as a Service (PaaS) is a cloud computing service model where a third party offers the necessary software and hardware resources (Sahu, 2020). In this service model, the operating system, hardware and network are provided by the service provider while the library installs their own software and applications. According to Kumar (2021), the library does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application. This enables academic libraries overcame the frequent cases of server and other hardware devices breakdown since information resources are stored in multiple secured locations.

Equally, the scalable components of PaaS allow it meets the incomparable information needs of academic libraries growing clientele. Academic library users are assured of real time information access and retrieval. PaaS rather enables academic libraries share resources with other libraries, perform data migration etc.

Statement of the Problem

Over the years, academic libraries have been experiencing frequent breakdown of servers and other device failure such as installation and licensing, frequent collapse of library's in-house databases for records, archival and institutional repositories; poor maintenance of hardware devices, incompetency of staff in database management, etc. More devastating was the outbreak

of the maiden corona virus and the need for social distancing. Libraries doors were locked, internal databases and institutional repositories shut due to "stay at home order" imposed by government to prevent the spread of the virus. Library's primary objective of providing effective information service to users were undermined as users were debilitated from information access and retrieval due to unavailable digital resources. Consequently, several information users lost confidence in the library.

To salvage their position as primary information providers and subsequently, meet the 21st century digital information needs of library's growing clientele, academic libraries the world over and Nigeria inclusive are incorporating Platform as a Service for effective service delivery to users. Based on the aforementioned, this study seeks to establish the extent to which Platform as a Service is used for service delivery in Federal University libraries in South-South and South-East, Nigeria.

Objective of the Study

To determine the relationship between Platform as a Service and information service delivery in federal University libraries in South-South and South-East Nigeria.

Research Question

What is the relationship between Platform as a Service and information service delivery in federal University libraries in South-South and South-East Nigeria?

Hypothesis

There is no significant relationship between Platform as a Service and information service delivery in federal University libraries in South-South and South-East Nigeria?

Review of Related Literature

Platform as a Service (PaaS) provide cloud components to certain software while being used mainly for applications. Gowda, Alam, Madu & Chaudhary (2019) defined it as a service model that allows the developer and user, to build, deploy, integrate, migrate, secure, and manage the web and mobile application and their related services over the web in the digital environment with the ready-to-use programming component such as, Internet of the Things

(IoT). Sahu (2020) stated that Platforms as a Service (PaaS) are 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 database needed for development.

Onwubiko, Okorie & Onu (2021) viewed it as a service platform or environment that allow developers to build the required applications of software and users have access simply via web browser over the Internet. Hurwitz (2021) noted that Platform as a Service (PaaS) is an abstracted and integrated cloud-based computing environment that supports the development, running, and management of applications in libraries and information The delivery model of PaaS is similar to Software as a Service (SaaS), except instead of delivering the software over the internet, PaaS provides a platform for software creation. This platform is delivered via the web, prompting the libraries to provide only the software while the service provider delivers the operating systems, software updates, storage or infrastructure.

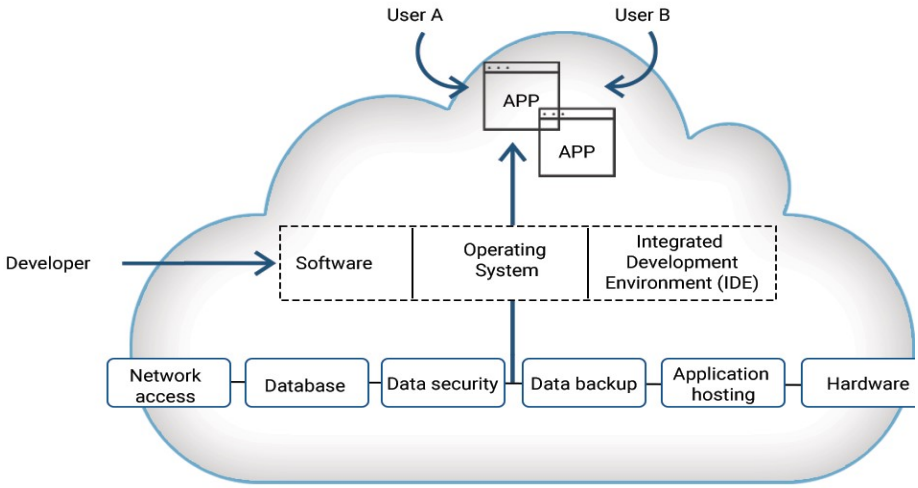
Since its emergence, the cost and speed of providing information services to users have considerably reduced. University libraries spent less in the acquisition and maintenance of hardware, operating systems and network. Breeding (2018) agrees that academic libraries benefit in the use of Platform as a Service (PaaS) in terms of reduced running cost, scalability, innovation and librarians' skills improvement, provision of tag cloud for collection identification and limitless opportunity for libraries to build and manage their own data centres

Another reason academic libraries, the world over, embraced the seeming possibilities of Platform as a Service is its unprecedented storage device. According to Adegbilero-Iwari (2017), university libraries no longer need the servers and other storage devices as the service provider provides and host the storage device in a secure location. These storage devices are stored in multiple locations where library users are provided with inexhaustible access to information resources from different locations. According to Abidi & Abidi (2012), the need for maintaining and backing up data will be no more the responsibility of the libraries since all data will be stored in the cloud managed by the cloud provider. Fagbola, Smart & Oluwaseun (2020) affirmed that Platform-as-a-Service affords academic library the liberty to explore development options without the need to purchase and maintain required infrastructure.

Consequently, the idea of resource sharing which had been one of the principal objectives of academic libraries becomes a reality. This is made possible by its unified management

supports discovery systems. According to Yang, Huang, Li, Liu & Hu (2017), the cloud based new generation of PaaS allows many libraries to share useful data. For instance, sharing of full-text journal titles from electronic databases where many libraries subscribe to the same databases. Ezenwoke & Igbekele (2019) corroborated that PaaS help libraries to keep track of the latest available literature on different subjects. Yang et al (2017) reported that if libraries can integrate their data, there would be no more duplication since the libraries would be sharing the common data. In view of its prevailing position in real time information access and dissemination, several academic libraries have incorporated PaaS in information service delivery. According to Adegbilero-Iwari & Hamzat (2017), many library vendors have changed to cloud platform services.

Figure 1: How PaaS Works



Source: spiceworks.com

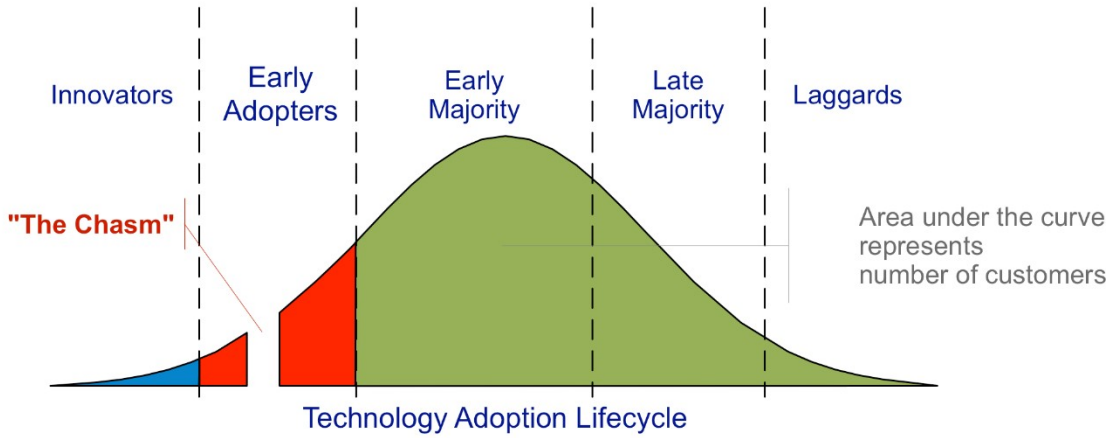
Theoretical Foundation and Research Model

The theoretical foundation of this study was derived from Rogers (2003) Diffusion of Innovation Theory. Diffusion of Innovation theory is one of the oldest social science theories which originated in communication with the purpose of explaining how an idea or product gains momentum and diffuses through a specific population or social system. The theory holds that acceptance of any technology/information system by users is influenced by such characteristics as compatibility, complexity, observability and relative advantage of the technology as well as the intensity of promotion by individuals, known as change agents. It provides a holistic insight

into organisational adoption of innovations (new ideas, concepts, or objects) and under issues around the adoption of technologies/information system such as cloud computing.

Under the diffusion of innovation theory, there are five established categories of technology adopters. The categories are: innovators, early adopters, early majority, late majority and laggards. Innovators are "venturesome" and cosmopolitan in outlook, tend to be better educated, willing to take risks, and are more socially mobile than their peers. While the early adopters are already aware of the need to change and so are very comfortable adopting new ideas; the early majority usually adopts new ideas before the average person but typically needs to see evidence that the innovation works before they are willing to adopt it whereas the late majority are always sceptical of change, and will only adopt an innovation after it has been tried by the majority but the laggards are tradition bound people and they are very conservative. They are very sceptical of change and are the hardest group to bring on board.

Figure 1: Diffusion of Innovation theory



Source: Rogers, 2003

This theory bears relevance to the study based on the fact that Nigerian academic libraries cannot be left behind in the paradigm shift. As library services have shifted from traditional to virtual, there is the need for such services to be incorporated in services delivery to users. Platform as a Service is highly compatible and facilitate easy access and retrieval of information resources in real time. More so, as library tries to adjust to the new normal, cloud computing becomes highly irresistible in information service delivery.

Methodology

Design of the Study

Descriptive survey design was adopted for this study due to its ease of use in studying large and small populations by selecting and studying samples chosen from the population to discover the relative incidence, distribution, interrelations of sociological and psychological variables.

Scope of the Study

This study is restricted to the following university libraries located in the South-East and South-South geographical zones of Nigeria; Federal University, Otuoke (FUO), Federal University of Petroleum Resources, Effurun (FUPRE), Federal University of Technology, Owerri (FUTO), Nigeria Maritime University, Okerenkoko (NMU), Michael Okpara University of Agriculture (MOUA), Nnamdi Azikiwe University, Awka (NAU), University of Benin (UNIBEN), University of Calabar (UNICAL), University of Nigeria, Nsukka (UNN), University of Port Harcourt (UNIPORT) and University of Uyo (UNIUYO).

Population of the Study

The population of the study is made up of One Hundred and Seventeen (117) library staff (librarians) who work in the electronic library (e-library) sections of the case studies. The e-library comprised of three units; internet, institutional repositories and automation units.

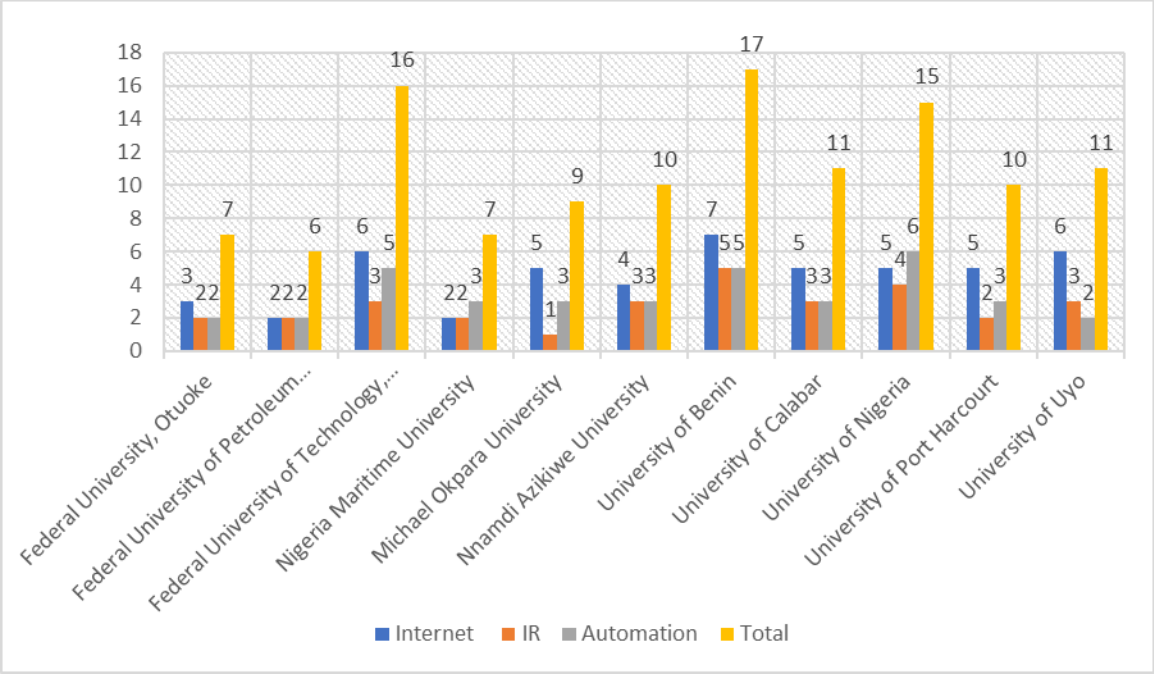
Table 1: Population Distribution

Universities	Internet Unit	Institutional Repositories Unit	Automation Unit	Total
Federal University, Otuoke	3	2	2	**7**
Federal University of Petroleum Resources, Effurum	2	2	2	**6**
Federal University of Technology, Owerri	6	3	5	**14**
Nigeria Maritime University, Okerenkoko	2	2	3	**7**
Michael Okpara University of Agriculture, Umudike	5	1	3	**9**
Nnamdi Azikiwe University, Awka	4	3	3	**10**

University of Benin, Benin	7	5	5	**17**
University of Calabar, Calabar.	5	3	3	**11**
University of Nigeria, Nsukka	5	4	6	**15**
University of Port Harcourt, Port Harcourt.	5	2	3	**10**
University of Uyo, Uyo.	6	3	2	**11**
Total	**50**	**30**	**37**	**117**

Source: Field data (2022)

Figure 3: Distribution of Population of the Study



Source: University Librarians' Offices and Circulation Desks of the Respective Institutions

Sample and Sampling Techniques

Census sampling technique was used in this study to select 117 respondents from the Eleven (11) Federal University Libraries studied

Instrument for Data Collection

A structured questionnaire titled "Platform as a Service and Information Service Delivery Questionnaire (PSISD)" was used in collecting data for the study, and divided into two sections. Section 'A' contains personal data of the respondent such as qualification and name of institution. Section B contained questionnaire items generated in line with the research questions

and hypotheses. The questionnaire was developed using 4-point rating scale; Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD).

Data Collection

The copies of questionnaire were administered by the researchers and assistants. As a result of the dispersed nature of the institutions studied, the researchers collaborated with research assistants, who are members of staff in the institutions for the purpose of administration and retrieval of the research instruments. There was a huge response rate of 98.29% return of the research instrument because only two copies of the instruments were not returned.

Data Analysis

The data generated was analysed using frequency distribution, percentages Multiple Linear Regression.

Findings

Table 2: **Frequency Distribution and Percentages of Platform as a Service (PaaS) and Information Service Delivery in University Libraries in South-South and South-East, Nigeria**

S/N	Platform as a Service (PaaS)	SA	A	Total	%	D	SD	Total	%
1	The library is subscribed to a Platform as a Service (PaaS)	36	73	109	93.2	3	5	8	6.8
	The Platform as a Service subscribed by the library are:								
2	Open skies	43	41	84	71.8	20	13	33	28.2
3	Serial Solution (ProQuest)	64	42	106	90.6	9	2	11	9.4
4	Future of Library is Open (FOLIO)	37	37	74	63.3	19	24	43	36.7
5	Alma/Ex Libris	54	31	85	72.6	11	21	32	27.4
6	Online Computer Library Centre (OCLC)	64	42	106	90.6	9	2	11	9.4
7	Polaris integrated library system	31	35	66	56.4	30	21	51	43.6
8	Ebsco	43	41	84	71.8	20	13	33	28.2
	I used Platform as a Service (PaaS) in:								

9	virtual reference service delivery	73	38	111	94.9	5	1	6	5.1
10	online document delivery services	65	44	109	93.2	2	6	8	6.8
11	digital bibliographic service delivery	53	55	108	92.3	5	4	9	7.7
12	digital current awareness services	49	57	106	90.6	2	9	11	9.4
13	digital resources sharing	36	63	99	84.6	10	8	18	15.4
14	online collaboration	65	44	109	93.2	2	6	8	6.8
15	digital selective dissemination of information	73	38	111	94.9	5	1	6	5.1
16	digital reservation of information resources	49	57	106	90.6	2	9	11	9.4

Source: Field data (2022)

Table 2 above shows that 109 (93.2) of the respondents agreed that university libraries in South-South and South-East, Nigeria is subscribed to Platform as a Service (PaaS) and the PaaS provided are Open skies, Serial Solution (ProQuest), Future of Library is Open (FOLIO), Alma/Ex Libris, Online Computer Library Centre (OCLC), Polaris integrated library system and Ebsco. The above result further shows that 111 (94.9) of the respondents used it for virtual reference service delivery, 109 (93.2) used it for online document delivery services, 108 (92.3) used it for digital bibliographic service delivery 106 (90.6) used it for digital current awareness services, 99 (84.6), 109 (93.2), 111 (94.9) used it for digital resources sharing, online collaboration and digital selective dissemination of information service delivery respectively.

Research Question: What is the relationship between Platform as a Service (PaaS) and information service delivery in university libraries in South-South and South-East, Nigeria?

Table 3: **Linear Regression on the Relationship between Platform as a Service (PaaS) and Information Service Delivery in University Libraries in South-South and South-East, Nigeria**

Variable	R	R^2	& of contribution	Adjusted R	Remark
Platform as a Service	0.835	0.749	74.9	0.65	significant relationship
Information Service Del.					

Source: Field data (2022)

Table 3 above shows the correlation coefficient (R) of 0.835 signifying that there is a very strong linear relationship between Platform as a Service and information service delivery in university libraries in South-South and South-East. This implies that for the subscription to Platform as a Service, there exist an effectiveness in information service delivery. The R^2 of 0.749 indicated that Platform as a Service contributed 74.9 % to the observed variation in information service delivery in university libraries in South-South and South-East. The finding revealed that Open Library Environment (OLE), Intota of Serial Solutions/ProQuest, Open Skies, Alma/Ex Libris and WorldShare/OCLC are among the Platform as a Service used for information service delivery in university libraries in South-South and South-East, Nigeria.

Null Hypothesis: There is no significant relationship between Platform as a Service (PaaS) and information service delivery in university libraries in South-South and South-East, Nigeria.

Discussion of Findings

There exists a significant relationship between Platform as a Service and information service delivery. The r-value of 0.865 and the r-critical. of 0.195 indicated significant relationship of the variables. This implies that University libraries in South-South and South-East, Nigeria subscribed to Platform as a Service for effective and efficient service delivery. The finding revealed that Open Library Environment (OLE), Intota of Serial Solutions/ProQuest, Open Skies, Alma/Ex Libris and WorldShare/OCLC are among the Platform as a Service used for information service delivery in university libraries in South-South and South-East, Nigeria. The finding of this study agrees with the finding of Adegbilero-Iwari & Hamzat (2017) that many library vendors in Nigerian academic libraries have changed to cloud-based platform such as Open Library Environment (OLE), and Online Computer Library Centre (OCLC) by WorldCat.

Conclusion

As information users yearn for quality information service delivery there is need for Nigerian academic libraries to be strategically positioned for this paradigm shift. Apparently, academic libraries in South-South and South-East, Nigeria have kept the pace of information service delivery to users by incorporating Platform as a Service thus facilitating information access and retrieval for research and other academic activities in real time.

Recommendations

Based on the findings of the study, it is recommended as follows:

- University libraries in Nigeria should be equipped with cloud computing technologies to enhance efficient service delivery to library clientele.
- University management should as a matter of urgency allocate adequate funds for subscription to Platform as a Service in academic libraries in Nigeria.
- Availability and functionality of cloud computing in academic libraries should be a criterion for accreditation purposes for the National University Commission (NUC) National Board for Technical Education (NBTE) and the National Commission for Colleges of Education (NCCE).
- Management of University libraries in Nigeria should ensure that uninterrupted power supply exist in libraries for effective information service delivery to users.
- Management of University libraries should ensure that e-librarians are adequately trained and re-trained for competencies in Platform as a Service

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