

Challenges and Prospects of Using Open Source Software in University Libraries in South Nigeria

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ABSTRACT

Aim of the Study: Technology application in university libraries has become inevitable, eventually becoming the major means of information dissemination in a digital world. Information seekers are now technology savvy such that for libraries to meet up with their information needs, they have to embrace new technological trends of service delivery. Hence, this study examined the challenges and prospects of using Open Source Software in University Libraries in South - south, Nigeria.

Methodology: The descriptive research design was employed in the study with research questions raised and answered along with hypotheses tested. The population, which also served as the sample size of the study, made up of 203 library staff of selected university libraries in the region adopted the total enumeration sampling technique for the study. The instrument for data collection was the questionnaire with a reliability of 0.84 realized from a test retest statistical method. However, 195 respondents representing 96.1% was the response rate.

Findings: The data were analyzed using descriptive statistics such as mean and standard deviation to answer the research questions while the hypotheses were tested using t-test statistics at 0.05 level of significance.

Conclusion: The study revealed network and server problem, lack of training and retraining of staff and constant power failure were the major challenges faced by library staff in using OSS. The prospects for enhanced OSS use in university libraries based on the findings includes the provision of adequate funds for the maintenance of infrastructure, provision of standby electric power generating set, training and retraining of staff and provision of effective internet facilities.

Keywords: Challenges, Prospects, Open Source Software, University Libraries, Nigeria.

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Introduction

The application of Information and Communication Technology (ICT) in library routine activities (such as administration, reporting, selective dissemination of information (SDI) services, etc.) is inexorable. In the view of Mukhopadhyay (2016), libraries globally have seen the need to forego the traditional status to a dynamic world of technology. Hence, libraries are engaged in the use of integrated library management system (ILMS) for library activities as an avenue for effective and efficient service delivery to clientele at minimal costs. Therefore, university libraries have embraced, and using various ICT related facilities, including software in its operations for effective services.

Given the financial involvement of library software, application and maintenance associated with modern library services, university libraries especially in the third world countries have now embraced the utilization of Open Source Software (OSS) in the automation of their operations (Ukachi, 2012). None the less, there are several OSS to the disposal of libraries worldwide. The proliferation of OSS has spurred libraries especially in Nigeria to see the need to adopt KOHA Integrated Library Management System for automation, which is widely used in libraries today as against other OSS and the costly proprietary software. According to Uzomba, Oyebola and Izuchukwu (2015), KOHA user's interface has been designed to be simple and adaptable, have been written in different languages for easy adoption and use. It is structured to include simple and clear interface for librarians and library members (patrons), union catalogue facility, customizable search, circulation and borrower management, serials system for magazines or newspapers among others (Wikipedia, 2012). Omeluzor, Adara, Ezinwanyi, Bamidele and Umahi (2012) stated that libraries world over have embraced KOHA right from inception because of the up grading and fortifying ability of the software. The success rate of this OSS has been the reason why libraries in Nigeria are clinging to it (Uzomba, Oyebola & Izuchukwu, 2015).

Some advantages of open source software were outlined by Chouhan (2010) as follows:

- i. **Lower software costs**, requiring no licensing fees or maintenance fees except for media, documentation and support, if required.
- ii. **Simplified license management**, were the software is obtained once and can be installed many times and in as many locations. There's no need to count, track, or monitor for license compliance.
- iii. **Lower hardware costs**, for it runs on Linux, which is an open source solution compactable and portable, requiring less hardware power to accomplish tasks as on conventional servers (Windows, Solaris) or workstations. The result is you can get it run by witless expensive or older hardware.
- iv. **Scaling/consolidation potential**, were multiple options for load balancing, clustering, and applications such as databases and email, giving organizations the ability to scale up for new growth or consolidate to do more with less.
- v. **Support**, is freely available and accessible through the online community via the Internet for open source—often superior to proprietary solutions.
- vi. **Escape vendor lock-in**, frustration from vendor lock-in is eliminated as a declaration of freedom of choice.
- vii. **Unified management**, provide the capability to integrate or consolidate server, service, application, and workstation management for powerful administration.
- viii. **Quality software**, been involved in a peer review process and community standards, plus the fact that source code is out there for the world to see, tend to drive excellence in design and efficiency in coding.

Similarly, Regoli (2015) mentioned these advantages of Open Source Software;

- i. **Cheaper than commercially marketed products**, they're offered for free and don't require one to pay for any additional copy download.
- ii. **Created by skillful and talented people**, thereby having access to world-class and state-of-the-art software.
- iii. **Highly reliable**, leading to products that have excellent quality and helpful features that perform well most (if not all) of the time.
- iv. **Help one become more flexible**, since there is no IT architecture that might require one to upgrade software and even hardware often.

While Stevens (2019) outlined the following advantages;

- i. **More Cost-Effective**, as using open source solutions enable organizations to be more agile in operations.
- ii. **More Frequent Performance Upgrades**, since it involves lots of people they all have their eyes on it to ensure its success and in fixing bugs or performing upgrades.
- iii. **Absolute Freedom**, lock up with particular vendor of technology is eliminated because users don't pay for the product, they are free to change or modify it to fit their exact needs at any time.
- iv. **Strong Communities of Supporters**, one can ask questions and often get help through other users of the software.
- v. **The Open Source Mindset**, the creators and community are collaborative and community/user-oriented in all aspects of the development.
- vi. **Transparency**, were one have access to the source code and find community discussion about how the code works thereby making it possible for changes or modifications.
- vii. **Lower Administrative Costs**, issues requiring IT staff to maintain, catalog and keep updates, usage monitoring or being tracked, usage limits, compliance issues, and many more things are reduced if not eliminated; which frees up administrative staff work.
- viii. **Top-Notch Security**, the Linus Law guide security issues of the software with all bugs at its minimum.

From the foregoing, it is evident that the OSS designed in a modular form addresses the various aspects of library operations, which can be modified (customized) for individual library usage. The modules are administrative, circulation, cataloguing and classification, serials, etc. The benefits of using OSS in library services also include: increased accessibility, adaptability/ transparency, economics, institutional change, pedagogy, power of networks and values/free culture. The current rate at which the use of OSS is spreading across Nigeria makes the future of librarianship in the country very bright. This means automating the library's processes using the software is a leverage for university libraries in Nigeria.

The issue of technology application (automation) in libraries is not without challenges in its planning, execution and operations. There are several difficulties in the implementation of these invaluable technologies in the country. The cost of ICT facilities (computers, connectivity, software, etc.) is enormous such that most library automation projects are either weak or failing. According to Reddy and Aswath (2015), lack of staff skills in the management and use of ILM software, cost of implementation, support, up grading, network security, data security and other security measures, sustainability, amongst others were the difficulties identified.

University libraries in Nigeria decry poor funding as a major barrier to automation and digitization (Randhawa, 2016). Privately owned university libraries that are not supported by public funds could adversely affect its performance (Onuoha, Samuel & Ojo, 2014). Therefore, open source software made

available should create a window of opportunities for the poorly-funded libraries to automate and digitize its resources. However, till date, many university libraries are still far from automating or deploying the OSS in their library operations and services. It is against this background that this study sought to investigate the challenges and prospects for using OSS in university libraries in South-south Nigeria.

Objectives of the Study

The purpose of this study is to investigate the challenges and prospects of using OSS in university libraries in Nigeria. Its objectives are to:

- i. Examine the challenges faced by library staff in the use of OSS in university libraries; and
- ii. Determine the prospects for the use of OSS by library staff in university libraries.

Research Questions

This study provided answers to the following research questions;

- i. What are the challenges faced by library staff in the use of OSS in university libraries?
- ii. What are the prospects for using the OSS by library staff in university libraries?

Hypotheses

The following research hypotheses were tested at 0.05 level of significance:

- H_{O1}: There is no significant difference between the mean responses of the male and female library staff on the challenges faced by library staff in the use of OSS in university libraries.
- H_{O2}: There is no significant difference between the mean responses of the male and female library staff on the prospects for using the OSS in university libraries.

Research Methods

This study focused on the challenges and prospects for the use of OSS by library staff in university libraries in South-south Nigeria. The descriptive survey research design was adopted for the study, which enabled the researchers to collect, systematically describe the facts and qualities of the respondents with regards to the challenges and prospects of using the OSS in university libraries. The population of the study is two hundred and three (203), which also stood for the sample size as the entire population was used for the study due to its small nature. That is the total enumeration sampling technique was adopted.

The self-designed research instrument used is the questionnaire tagged “Challenges and prospects for the Use of OSS by Library Staff Questionnaire” (CPUOSSLSQ) is made up of two (2) sections identified as Sections A and B and used as instrument for data collection. Section A contains the personal data of the respondents while Section B is made up of the challenges faced by library staff in the use of OSS and prospects for the use of OSS in university libraries. The instrument is a close-ended statement on a four-point rating scale. The respondents comprise of all library staff drawn from three (3) federal university libraries. The institutions are the University of Benin (75); University of Uyo (68) and University of Calabar (60), which were purposely selected due to their present adoption and use of the OSS and also due to proximity to the researchers.

The descriptive (mean and standard deviation) and inferential (t-Test) statistics were used to analyze data in the study. The descriptive statistics was used to answer the research questions while the later was used to test the null hypothesis at 0.05 level of significance.

Results

The results obtained from the data analyzed are hereby presented. Of the 203 copies of questionnaire administered, 195 copies were duly completed and returned, representing 96.1% response rate and hence used for the study. The analysis was based on the demographic variable of gender (male and female) of library staff.

In response to research question one, the data presented in Table 1 suffice.

Table 1: *Mean Responses of the Challenges Faced by Library Staff on the Use of OSS in University Libraries (n = 195)*

SN	Challenges	SA	A	D	SD	X	σ	RMK
1.	There is no control over data in OSS as it can be hacked by unauthorized person	143	52	-	-	3.73	.44	Accept
2.	OSS can be corrupted by an unauthorized person	118	77	-	-	3.60	.59	Accept
3.	In OSS, data can get lost during data migration	93	68	34	-	3.30	.75	Accept
4.	OSS is difficult to execute and implement without a software technologist	111	75	9	-	3.52	.58	Accept
5.	Inadequate software maintenance	60	135	-	-	3.31	.46	Accept
6.	How to train the library staff on the operational modules of OSS is risky	112	83	-	-	3.57	.69	Accept
7.	Replacement of existing OSS version with another new version is difficult	145	50	-	-	3.74	.43	Accept
8.	Support for solving problems at the installation implementation level and thereafter is expensive	120	67	8	-	3.57	.57	Accept
9.	Abnormal termination	128	67	-	-	3.65	.67	Accept
10.	OSS may crash, errors may occur and software bugs may affect it at anytime	93	68	34	-	3.30	.75	Accept
11.	Sustained support from the IT experts is not guaranteed	101	94	-	-	3.51	.50	Accept
12.	System can hang	142	53	-	-	3.72	.44	Accept
Aggregate Mean						3.54	.57	

Note: \bar{X} = Mean, σ = Standard Deviation of a population, SA=Strongly Agree, A= Agree, D= Disagree, SD =Strongly Disagree, n = number of respondents, Rmk = Remark. Criterion Mean is 2.50.

The data presented in Table 1 above shows that the aggregate mean of 3.54 and aggregate SD of 0.57 were realized, which is greater than the criterion mean of 2.50. It implies that the respondents' views bring to bear the challenges faced by library staff in the use of OSS in university libraries in Nigeria. Also, the result for testing of hypothesis one is presented in Table 2 below revealing the relationship between the mean responses of the male and female library staff on the challenges faced in the use of OSS in university libraries.

Table 2: *The t – Test Analysis of the Mean Responses of Male and Female Library Staff on the Challenges Faced in the Use of OSS in University Libraries (Male = 102, Female = 93)*

SN	Challenges	\bar{X}_M	σ_M	\bar{X}_F	σ_F	t-cal	p-value	Rmk
1.	There is no control over data in OSS as it can be hacked by unauthorized person	3.66	0.47	3.80	0.39	2.22	0.03	S*
2.	OSS can be corrupted by an unauthorized person	3.60	0.50	3.62	0.45	0.21	0.10	NS
3.	In OSS data can get lost during data migration	3.35	0.82	3.25	0.65	0.92	0.35	NS
4.	OSS is difficult to execute and implement without software technologist	3.57	0.47	3.45	0.65	0.97	0.30	NS
5.	Inadequate software maintenance	3.33	0.47	3.27	0.45	0.81	0.41	NS
6.	How to train the library staff on the operational modules of OSS is risky	3.68	0.56	3.45	0.50	3.39	0.00	S*
7.	Replacement of existing OSS version with another new version is difficult	3.92	0.27	3.54	0.50	6.55	0.00	S*
8.	Support for solving problems at the installation implementation level and thereafter is expensive	3.59	0.49	3.54	0.65	0.60	0.54	NS
9.	Abnormal termination	3.67	0.47	3.63	0.48	0.61	0.53	NS
10.	OSS may crash, errors may occur and software bugs may affect it at anytime	3.31	0.65	3.28	0.83	0.14	0.13	NS
11.	Sustained support from the IT experts is not guaranteed	3.58	0.49	3.44	0.69	0.07	0.14	NS
12.	System can hang	3.85	0.77	3.60	0.39	2.36	0.02	S*

N = Number of respondents, X = Mean of respondents, σ = Standard deviation of a population, df = degree of freedom (193), t-cal= t-calculated, sig. (p-value) = significant at $p < .05$, NS = Not significant, S* = Significant.

The result in Table 2 revealed that 8 items had their p-values ranged from 0.10 to 0.54, which are greater than the alpha-value of 0.05. This shows that there was no significant difference between the mean responses of male and female library staff on the 8 challenges in the use of OSS in the university libraries. The table further reveals that 4 items had their p-values ranged from 0.00 to 0.03 which were less than the alpha-value of 0.05 indicating that there is a significant difference between the mean responses of male and female library staff. Therefore, since p value for most of the items are more than 0.05, it implies that there is no significant difference between the mean responses of the male and female library staff on the challenges faced in the use of OSS in university libraries in Nigeria and is hereby accepted.

Therefore, the challenges faced by library staff in the use of OSS in university libraries include; lack of control over data in OSS leading to the possibility of hacking or being corrupted by unauthorized persons, data could get lost in the cause of data migration, the probable expensive support for solving problems at the installation and implementation levels, difficulty in executing and implementation without software technologist, inadequate software maintenance, difficulty in the replacement of existing OSS version with a new version and abnormal termination.

From the above, lack of adequate technical support is a major issue in using OSS. The study of Muruli and Kumar (2014) on the attitude of potential NewGenLib software users towards the adoption of OSILS in Indian corroborates the findings of this study stating that libraries lack the technical support and shortage of skilled manpower to execute, install, maintain and customize the software. Also, the findings of this study is in agreement with the findings of Ukachi (2012) who carried out a study on “awareness and utilization of open source software in Nigerian libraries: the way forward” and found that there are some impediments such as managements insensitivity to the relevance of the software (54.8%); fear of service support problem (64.3%) and non-availability of internet access in the libraries to enhance downloading of software (61.99) in the way of use of open source software in Nigerian libraries. In a similar vein, Tarus, Gichoya and Muumbo (2015) in their study titled “challenges of implementing e-learning in Kenya found that e-learning comes with some challenges that must be addressed by Kenya public universities before successful implementation can be realized. It further revealed that the implementation challenges faced by the three universities have continued to impact negatively on its effective utilization.

On the second research question on the strategies adopted to enhance the use of OSS in university libraries, the data presented in Table 3 provide the required answers.

Table 3: *Mean Responses of Library Staff on the Strategies to Enhance the Use of OSS in University Libraries (n = 195)*

SN	Strategies	SA	A	D	SD	\bar{X}	σ	RMK
1.	Provision of stable power supply to the university libraries	111	84	-	-	3.56	.49	Accept
2.	Increase government and management technical support through recruitment of ICT technicians	102	93	-	-	3.52	.50	Accept
3.	Provision of reliable and high speed network	119	60	16	-	3.51	.64	Accept
4.	Adequate funding by government and management of the school	103	92	-	-	3.52	.50	Accept
5.	Adequate support by OSS developers	68	127	-	-	3.34	.47	Accept
6.	Network administrators/managers should be engaged in the university library	136	51	8	-	3.65	.55	Accept
7.	Adequate maintenance and upgrading of infrastructure	135	60	-	-	3.69	.46	Accept
8.	Provision of adequate and effective ICT facilities	84	111	-	-	3.43	.69	Accept
9.	Capacity building and sustainable training of library staff in effective use of ICTs	145	50	-	-	3.74	.43	Accept
10.	Increased awareness raising and advocacy among relevant stakeholders on the need for OSS in libraries	136	51	8	-	3.65	.55	Accept
Aggregate Mean						3.56	.53	

Note: \bar{X} = Mean, σ = Standard Deviation of a population, SA=Strongly Agree, A= Agree, D= Disagree, SD =Strongly Disagree, n = number of respondents, Rmk = Remark. Criterion Mean is 2.50.

From the data presented in Table 3 above, it was revealed that the aggregate mean of the items is 3.56, which is greater than the criterion mean of 2.50. The result shows the strategies adopted by library staff for enhancing the use of OSS in university libraries in Nigeria. Since the aggregate mean of 3.56 with aggregate standard deviation value of 0.53 that is higher than p-value, it implies that efforts by library staff to enhance the use of OSS in university libraries are in the right direction. The data for testing of hypothesis two are presented in Table 4.

Table 4: *The t – Test Analysis of the Mean Responses of Male and Female Library Staff on the Strategies to Enhance the Use of OSS in University Libraries (Male = 102, Female = 93)*

SN	Strategies	\bar{X}_M	σ_M	\bar{X}_F	σ_F	t-cal	p-value	Rmk
1.	Provision of stable power supply to the university libraries	3.58	0.49	3.54	0.50	0.55	0.57	NS
2.	Increase government and management technical support through recruitment of ICT technicians	3.54	0.49	3.49	0.49	0.21	0.12	NS
3.	Provision of reliable and high speed network	3.65	0.73	3.42	0.45	3.13	0.01	S*
4.	Adequate funding by government and management of the school	3.67	0.67	3.36	0.48	3.54	0.00	S*
5.	Adequate support by OSS developers	3.32	0.59	3.36	0.44	0.25	0.22	NS
6.	Network administrators/managers should be engaged in the university library	3.75	0.73	3.54	0.65	2.63	0.01	S*
7.	Adequate maintenance and upgrading of infrastructure	3.78	0.50	3.60	0.39	0.37	0.50	NS
8.	Provision of adequate and effective ICT facilities	3.41	0.49	3.45	0.50	0.55	0.57	NS
9.	Capacity building and training of library staff in effective use of ICTs	3.73	0.37	3.74	0.48	0.06	0.10	NS
10.	Increased awareness raising and advocacy among relevant stakeholders on the need for OSS in libraries	3.75	0.43	3.54	0.65	2.63	0.03	S*

N = Number of respondents, \bar{X} = Mean of respondents, σ = Standard deviation of a population, df = degree of freedom (193), t-cal= t-calculated, sig. (p-value) = significant at $p < .05$, NS = Not significant, S* = Significant.

Data in Table 4 revealed that 6 of the items tested had p-values range from 0.10 to 0.57 which were greater than the alpha-value of 0.05. This shows that there was no significant difference between the mean responses of male and female library staff on those strategies adopted to enhance the use of OSS in university libraries in Nigeria. The table also shows that 4 items had p-values ranging from 0.00 to 0.03 which were less than the alpha-value of 0.05. This shows that there was a significant difference between the mean responses of male and female library staff on those strategies adopted to enhance the use of OSS in university libraries in Nigeria.

Therefore, the hypothesis of no significant ($p < 0.05$) difference between the mean response of the male and female library staff on the strategies adopted to enhance the use of OSS in university libraries in

Nigeria, being the majority is hereby accepted. The strategies adopted by library staff for enhancing the use of OSS in university libraries are; provision of stable electricity power supply through a generating set, engaging network administrators/managers in the university library, providing adequate maintenance and upgrading of infrastructure, capacity building and training of library staff in effective use of ICTs and increased awareness/advocacy among relevant stakeholders on the need for OSS use in university libraries.

The findings of this study is supported by Tarus, Gichoya and Muumbo (2015) who in their study on challenges of implementing e-learning in Kenya suggested expansion of ICT e-learning infrastructure to facilitate the access to e-learning by students, teaching staff and other stakeholders through allocation of more resources towards ICT and e-learning infrastructural development, prioritization of ICT and e-learning in budgetary allocation like other core activities of the university, reduction in the cost of Internet bandwidth to make it more affordable to universities. Also, Gbaje (2007) in a desk study on implementing a national virtual library for higher institutions in Nigeria examined the virtual library project initiatives and suggested improvements in the basic national information infrastructure; increased capacity building for librarians and other information professionals who should learn and retool in information and web development technologies through professional development conferences and workshops.

Conclusion and Recommendations

From the study, it can be deduced that there are library staff in university libraries in South-south Nigeria face challenges in the adoption, implementation and use of OSS in carrying out library services. As a result, library managers must strategize for effective and efficient service delivery. Based on the findings, the following recommendations were made;

- i. All university libraries should deploy the use of OSS for better library operations and services to users. The University management should compulsorily engage system librarians with adequate technological and network operation ideas to facilitate adequate maintenance of the OSS system to minimize the challenges library staff could face in the use of OSS.
- ii. Provision of stable electricity power supply dedicated to the university libraries
- iii. Increased government and management technical support through recruitment of ICT technicians, provision of reliable and high speed network, adequate funding by government and management of the universities.
- iv. Training library staff on the operational modules of OSS is paramount since its fragility may crash it, errors may occur and software bugs may affect it if handlers lacks the know-how. Sustained training for library staff would improve staff skills in OSS use and they can maintain, upgrade the software regularly for better service delivery.
- v. Sustained support from IT experts is needed to guarantee the system and ensure security measures (CCTV) camera to check mate the users in the library as well as introducing the software dos and don'ts of the library through user's education programs and installing error codes or alarm in the systems.
- vi. Increased awareness raising and advocacy among relevant stakeholders on the need for OSS in university libraries.

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Conflict of Interest


Authors have no conflict of interest.

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References

- Chouhan, L. B. (2010). *Open Source Software (OSS) for Library Management*. National Institute of Science Communication and Information Resources (NISCAIR), Satsang Vihar Marg New Delhi
A Dissertation Submitted in Partial Fulfillment for Associateship in Information Science
- Gbaje, E. (2007). Implementing a national virtual library for higher institutions *Nigeria Libraries*, 17(2), 1-15.
- Mukhopadhyay, P. (2016). *Five laws and Ten Commandments: The open road of library automation in India*, In *Proceedings of national seminar on open source movement: Asian perspective*, Roork: IASLIC.
- Muruli, G. & Kumar, T. K. (2014). Attitude of NewGenLib software users towards the adoption of open source integrated library system in India. *International Journal of Digital Library Services (IJODLS)*, 4(4), 112-125.
- Okoh, H. E. ., & Iwhiwhu, B. E. (2022). Staff Use and Satisfaction with Open Source Software in the Management of Selected Federal Universities' Libraries in South Nigeria. *The Progress*, 3, 39–53.
- Omeluzor, S.U., Adara, O., Ezinwayi, M., Bamidele, M.I. & Umahi, F.O. (2012). Implementation of Koha Integrated Library Management System Software (ILMS): The Babcock University experience. *Canadian Social Science*, 8(4), 211-221.
- Onuoha, U. D, Samuel, T.D. & Ojo, A.I. (2014). Job satisfaction and organisational commitment: A study of library personnel in private universities in Ogun State, Nigeria. *Access Library Journal*.
- Randhawa, S. (2016). Open source library management softwares. *E-library*. <http://shodhganga.inflibnet.ac.in/dxml/handle/1944/1247>.
- Reddy, A. & Aswath, L. (2015). Open source software in libraries: Threats and challenges. *International Journal of Library and Information Science Studies*, 5(1), 214-224, Jan-Mar.
- Regoli, N. (2015). 7 Main Advantages and Disadvantages of Open Source Software. *Connect US*, <https://connectusfund.org/>
- Stevens, G. (2019). 8 Advantages of Using Open Source Software. *Tech Zone* <https://www.znetlive.com/blog/>

- Tarus, J. K, Gichoya, D & Muumbo, A. (2015). Challenges of Implementing E-learning in Kenya: A case study of Kenyan Punic universities. *International Review of Research in Open and Distributed Learning*, 16 (1), 120-141.
- Ukachi, N. B. (2012). Awareness, availability and utilization of open sources software in Nigerian libraries: the way forward. *International Research Journal of Library, Information and Archival Studies*, 2 (1), 001-009.
- Uzomba,E. C., Oyebola, O. J. and Izuchukwu, A. C. (2015). The use and application of open source integrated library system in academic libraries in Nigeria: Koha example. *Library Philosophy and Practice*.
- Wikipedia (2012). Koha (software). [https://en.wikipedia.org/wiki/Koha_\(software\)](https://en.wikipedia.org/wiki/Koha_(software)).
- Wikipedia (2016). Integrated library system. [https://en.wikipedia.org/wiki/Integrated_library system](https://en.wikipedia.org/wiki/Integrated_library_system)