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# USE OF OPEN SOURCE TECHNOLOGY FOR EFFECTIVE ACADEMIC LIBRARY SERVICES IN NIGERIA

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# USE OF OPEN SOURCE TECHNOLOGY FOR EFFECTIVE ACADEMIC LIBRARIES SERVICES IN NIGERIA

## BY

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**ABSTRACT**
This study focuses on the need for academic libraries to adopt open source software technology for effective library services in Imo State, Nigeria. Descriptive survey research method was used to elicit responses. About 82 respondents consisting of librarians in the six academic institutions in the state were used for the study. Consequently, 82 copies of questionnaire were administered and 63 representing 78% were returned. Descriptive statistics was used to analyze the data gathered. The results indicated that out of the 6 academic libraries involved in the study 1 is presently using D space and word press while others are yet to commence any form of digital management system. The finding of the study shows that certain factors such as lack of technological knowledge for its adoption 58(92%) passive attitude towards the use of technology by management 53(84%) lack of Internet facilities to download and use software 50 (79%) amidst others were found to be militating against the provision and utilization of information resources and services. The study recommends that academic libraries should key into the open source technology because it is free, stable, adaptable and supported by network of global community. This is imperative for academic libraries in Nigeria to bring back their users.

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## 1.0 INTRODUCTION

The development in the field of information technology (IT) is rapidly changing academic library services. The need for open source technology in library activities such as acquisition, cataloguing, circulation, serials and reports management all over the world is gaining grounds as libraries are moving from traditional practice to electronic system. The Web based information access of all kinds available free has made open source technology an indispensable research and learning environment. The term open source software has recently witnessed a variety of definitions. For example, the open source presents an open-source philosophy, and further defines a boundary on the usage, modification and redistribution of open-source software, software licenses grant rights to users which would otherwise be prohibited by copyright. These include rights on usage, modification and redistribution (Randhawa, 2012). Reddy and Kumar (2013) define it as computer software whose source code, free distribution and no discrimination against field of knowledge is available under a license such as public domain. On the other hand, Santos, Kuk, Kon and Pearson (2013) elaborately argued that open source software is software that provides access to the source code, meaning that users are free to see how the product is made, h right to modify the product code, update to different versions, resell the new product with the guarantee that they must also provide their source code. Modifying the product and redistribution are the two main components of open source software (Muir, 2005).

The question is "If open source is so splendid what is stopping libraries in Nigeria immediately becoming open source"? Part of the answer is that the awareness of open source technology is still new in Nigeria but the challenge is much more than integration but of individuals and organisational lack of technological skill, knowledge and passive attitude towards the use of technology for effective information service delivery. Also is of the library management to device ways to use open source software effectively to absorb the inevitable changes and to create the required technological environment frameworks. To make fundamental changes in the system requires interrelated shifts from the traditional to technological approach to library operations especially in the acquisition, cataloguing, circulation and serial management. Academic library users in Nigeria face difficulties because of the traditional nature of provision of information services and so do not fit into the prevailing information knowledge community globally. The open source technology has provided an opportunity in the context of open accessibility of knowledge and nurturing knowledge valuable to library users. The role of the librarian has changed so that it goes hand in hand with the implementation of these new technologies. Bolan and Cullin (2007) explained that information professionals need to address these technological advances in order to meet the new goals and challenges of the twenty-first century. Nigerian academic libraries and librarians should key in beyond boundaries with the aim of making information free for teaching, learning and research.

In that respect therefore, academic libraries in Imo state are expected to provide all necessary information services that best meet the information needs of their clients in this 21$^{st}$ century. Unfortunately however, Okiy (2011) lamented the gross under funding of universities which has adverse effect on the library development and subsequently, the services they could offer. The use of information technology in academic libraries measures the worth of an item to a library or information system. Use is therefore, the reason which could be used to determine the reason for open access of a library resources and use is important in determining the type of services needed for in the development effort of the library. Use also justifies the need for institutions to adequately finance their libraries or face dwindling library services. Thus, the need for open

source technology integrated library services so that academic libraries in Imo State can join the world information community in the free access movement.

## 1.1. PROBLEM OF THE STUDY

Open software is the latest trend in integrated library management of acquisition, cataloguing, serial services, circulation control and report management. However, many of the academic libraries in Nigeria are focusing on automation but are not aware of the use and benefits of open source technology such as Koha, Dspace and Joomla in information management despite its numerous advantages. Academic libraries in Nigeria that have introduced automation and integrated library systems made use of proprietary software such as Alice and Alexandra. This is because library management and librarians do not have knowledge about the open source software and how it works. Taking into consideration that funding of academic libraries is a big problem in Nigeria given the dwindling economic state of the Nation. The problem of this study is for academic libraries to adopt and key into open source technology movement. This is because the use of open source will create a window of effective information management and dissemination in academic libraries in Imo State Nigeria.

## 1.2. OBJECTIVES OF THE STUDY
The broad objective of the study is to investigate the use of open source technology in academic library in Imo State.

The specific objectives of the study are:
- Identify the different types of open source software technology
- Determine the extent of the use of open source software technology
- Determine the factors militating against the use of open source software technology
- Recommend possible solutions to these problems.

## 1.3. RESEARCH QUESTIONS
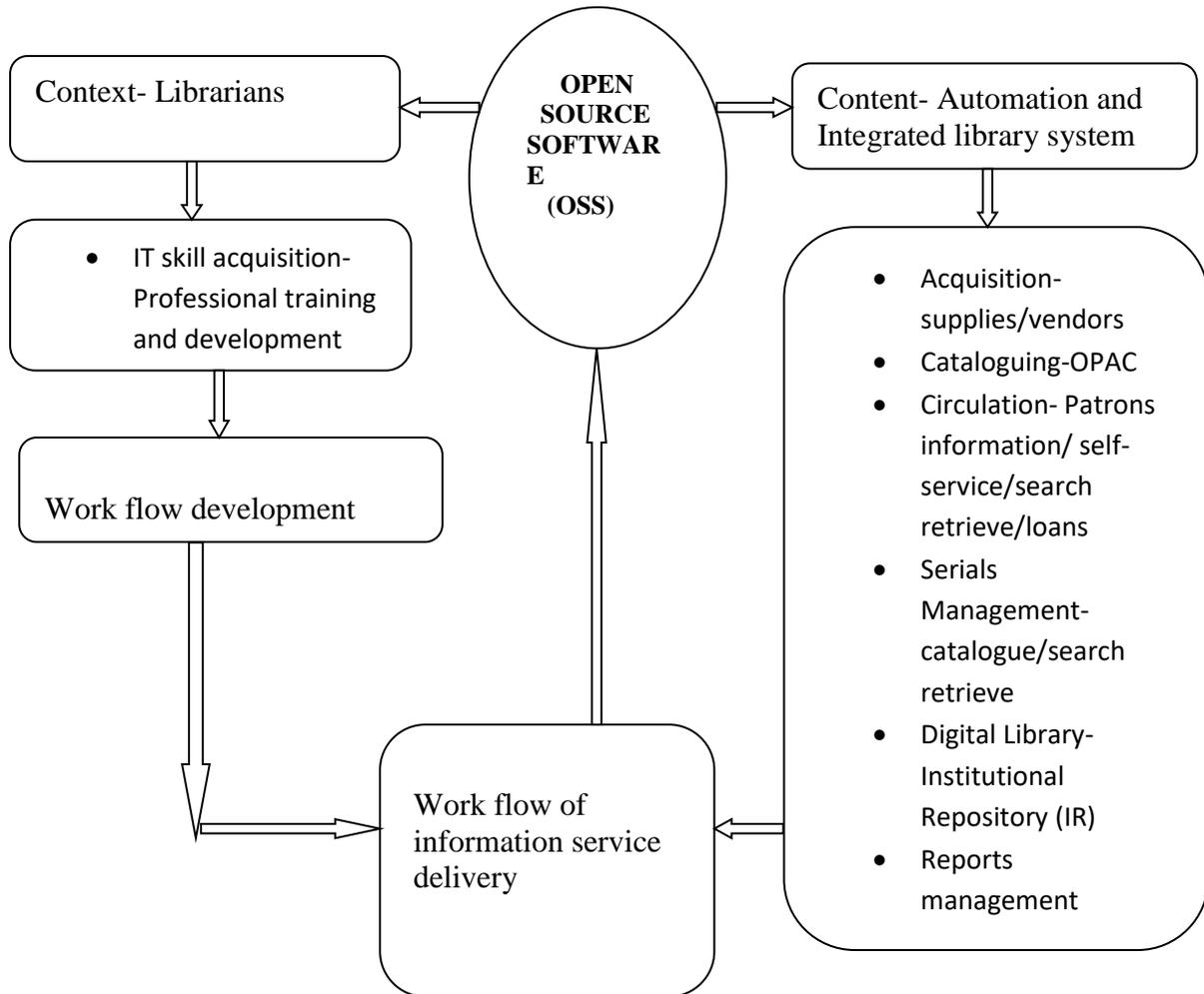The study is guided by the following research questions:
- What are the different types of open source software technology?
- What is the extent of use of open source software technology?
- What are the factors militating against the use of open source software technology?
- What are the recommendations to these problems?

## 2.0. LITERATURE REVIEW

The open source software (OSS) initiative is one such development that is changing the access to information system. Open source is many things from openness, flexibility, adaptability, speed, support and standards (Reddy and Kumar, 2013). It offers many opportunities for libraries and educational institutions to embrace automation as the facilities provided go far beyond the acts of traditional libraries. (Wong and Sayo, 2010). Academic libraries that key into the movement of OSS and implement them appropriately stand to gain comparative advantage, while those that fail to take advantage of this opportunity may find their ICT development behind that of other libraries. Open source software (OSS) has become an international phenomenon that allows researchers around the world to share knowledge and skills on daily basics without barriers. Amollo (2013) examines the open source movement as a revolution in the field of library science that encourages automation. Rossi, Russo and Succi (2007) describe the characteristics of open source library management software including licensing, requirements and functionality as a mile stone in information dissemination. Ukachi (2012) maintains that the OSS is designed to meet the needs of library patrons. But today the OSS has immensely consolidated on that libraries can enjoy the full support of open source.

The open source integrated library services have become more popular in recent years, with a number of major systems and several companies offering support (Breeding, 2009). This has compelled some academic libraries in Nigeria to introduce open source integrated systems and in services such as acquisition, cataloguing, circulation, and serials services and reports management. Gireesh Kumar and Jayapradeep (2015) assert that many libraries are yet to realize the advantages of using an OSS for library management. It is an opportunity for library and information science professionals to introduce newer and customized services, cost efficiently. They maintained to in order to achieve these; the professionals are to upgrade their proficiencies and competencies in free open access software.

**Figure 1: Open Source Framework**

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┌────────────────────────┐        ╭─────────╮        ┌──────────────────────────┐
│  Context- Librarians   │ ◄───   │  OPEN   │  ───►  │  Content- Automation and │
│                        │        │ SOURCE  │        │  Integrated library      │
└───────────┬────────────┘        │SOFTWARE │        │  system                  │
            │                     │   E     │        └────────────┬─────────────┘
            ▼                     │  (OSS)  │                     ▼
┌────────────────────────┐        ╰─────────╯        ┌──────────────────────────┐
│ • IT skill acquisition-│             ▲             │  • Acquisition-          │
│   Professional training│             │             │    supplies/vendors      │
│   and development      │             │             │  • Cataloguing-OPAC      │
└───────────┬────────────┘             │             │  • Circulation- Patrons  │
            │                          │             │    information/ self-    │
            ▼                          │             │    service/search        │
┌────────────────────────┐             │             │    retrieve/loans        │
│ Work flow development  │             │             │  • Serials               │
│                        │             │             │    Management-           │
└───────────┬────────────┘             │             │    catalogue/search      │
            │                          │             │    retrieve              │
            │              ┌───────────┴──────────┐  │  • Digital Library-      │
            └────────────► │  Work flow of        │ ◄│    Institutional         │
                           │  information service │  │    Repository (IR)       │
                           │  delivery            │  │  • Reports               │
                           └──────────────────────┘  │    management            │
                                                      └──────────────────────────┘
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The conceptual framework of open source technology can best be described as reason and action. The reason being that the recent changes in technology has simplified the way information is accessed shared with effective services provided by academic libraries. The shift from traditional services is a reflection of academic libraries' dedication to helping students and researchers reach their highest academic potential (Morgan, Brandon and Shrem, 2013). However, action needs to be taken by academic libraries to build a consistent and coherent system framework, which supports the various systems with one another will be key in successfully adopting such a model approach based on open source technology. There are also several data and workflows that can change in the process of integration with the other systems especially if the library is migrating from proprietary to free software. This will demand much of librarians and management professionalism with new prioritizations and further implications.

**2.1. OPEN SOURCE SOFTWARE FOR ACADEMIC LIBRARY SERVICES**

Library and information centers are using various open source software for integrated library system. Open source software for library automation and management systems software are:

a. Open source library automation software:

- Koha - is the world's first free and open source Integrated Library System (ILS). It has features suitable for library management system of various types and sizes. Koha is a browser-based using an Online public access catalogue interface. There is no cost for the license; and users have the freedom to modify the product to adapt it to your library needs. Development is sponsored by libraries of varying types and sizes, volunteers, and support companies from around the world. The strength of Koha lies with its strong community of users, libraries and businesses that contribute to its development. Koha runs on Linux, Web and Server.

- Evergreen- is an open source integrated library system (ILS) software, freely licensed under the GNU GPL that helps library users locate library materials and manages, catalog, and circulate those materials despite the size or type of the library. It runs on Linux, Windows and Mac

- NewGenlib (NGL) - is an integrated library management system that provides a comprehensive support for many standards related library and information science. The Interface of is designed in such a way that even library managers without a library science background can use the system with little or no training. It provides many basic ILS functions as well as having several social media functions built in.

- OpenBiblio - is an easy to use, open source, automated library system containing OPAC, circulation, cataloging, and staff administration functionality. The purpose of this project is to provide a cost effective library automation solution for private collections and schools.

- Opals- Cooperatively developed, Cloud &Web-based, open source access to information databases and library collections.

**b. Open source Digital library/Institutional repository software:**

- DSpace - is an open source repository software package typically used for creating open access repositories for scholarly and/or published digital content. It is the software of choice for academic, non-profit, and commercial organisations building open digital repositories. DSpace preserves and enables easy and open access to all types of digital content including text, images, moving images, jpegs and data sets.

- Greenstone - is open software suitable for building and distributing digital library collections. It provides a new way of organising information and publishing it on the Internet or on CD-ROM. It is open-source, multilingual software, issued under the terms of the GNU General Public License. It runs on Linux, Windows and Mac.
- Fedora - open source software gives organisations a flexible service oriented architecture for managing and delivering their digital content. It is a powerful digital object model that supports multiple views of each digital object and the relationships among digital objects
- Eprints - an open source platform for creating self-configuring repositories for libraries and the publishing industry

**c. Open source learning management system software:**
- Moodle (**Modular Object-Oriented Dynamic Learning Environment**) - is a free open-source learning management system or e-Learning platform that serves educators and learners across the world. Moodle is a learning tool designed to provide educators, administrators and learners with an integrated system to create personalised learning environments.
- OLAT (Online Learning and Training) - is an open source learning management system designed to the needs of academic institutions. It is a web application learning management system that supports any kind of online learning, teaching, and tutoring with few educational restrictions.

**d. Open source electronics resource management system software:**
- Calibre is a free and open source e-book library management application developed by users of e-books for users of e-books

**e. Open source content management software:**
- Drupal-is a free and open source content management system that provides back-end for websites. It runs on linux.
- Joomla - is an open source platform on which Web sites and applications can be created. It is a content management system (CMS) which connects your site to a MySQLi, MySQL, or PostgreSQL database in order to make content management and delivery easier on both the site manager and visitor. Joomla's versatility, including its ease-of-use and extensibility has made it the most popular Web site software available because it is extremely customizable for different purpose.

- Wordpress - is an online, open source website creation tool written in PHP and MySQL. It has easy and probably the most powerful blogging and website content management system (or CMS) in existence today. Wordpress is a free and open-source content management system (CMS) based on PHP and MySQL and is installed on a web server.

The operational software for open source technology is Linux. Linus is a multitasking enhanced multiprocessing, multi-user, secured, no virus and no hanging, easy installation and administration free operating system. Most of the basic operating system tools for Linux come from the GNU project (GNU/Linux). The Ubuntu operating system is open source software that runs on Linux and best for library management systems. Creation ownership is basic advantage of open source. Academic libraries can migrate from proprietary software to free/open source software as Lockhaas and Moore (2010) highlight the advantages of open source software as: creation development, modification and standard development and free of cost of installation. The major advantages of open sources are security, portability, affordability, transparency, flexibility and adaptability. With open source software, the academic library's ability to manage its services is improved with greater control over data, information and software. Adoption of open source integrated library system will bring information closer to the users with increased interaction and community-based development. With its limitation being that it requires increased cooperation and interaction with the community in order to get the development that the library wants included in future updates. Also, though open source itself is free, there are hardware development and hosting costs to consider. However, even though the system itself is free, there are development and hosting costs to consider. Also, according to the examined literature, open source library systems take up more of staff time in the form of development and adaptations. Moreover, during the migration period the library must bear the cost both of the previous proprietary system and the implementation of the new system. The library therefore needs to spend more initially, in order to save at a later stage.
Despite the above limitations the benefits of an open source integrated management far exceed the limitations.

### 3.0. RESEARCH METHODOLOGY

Descriptive survey research was used for the study. The population of the study was put at 82 librarians from the six academic institutions in Imo state. Structured questionnaire was used as methods of data collection. About 82 respondents consisting of librarians in the six academic institutions in the state were used for the study. Consequently, 82 copies of questionnaire were administered and 63 representing 78% were returned. Descriptive statistics was used to analyze the data gathered. Data collected were analyzed using descriptive statistics with frequencies and percentages computed in tables.

### 4.0. RESULTS

**Table 1: Response Rate**

| S/N | Institutions | Population | Response | Percentage |
|-----|-------------|-----------|----------|-----------|
| 1. | Federal University of Technology Owerri | 30 | 26 | **86** |
| 2. | Imo State University Owerri | 12 | 9 | **75** |
| 3. | Federal Polytechnic Nekede | 10 | 6 | **60** |
| 4. | Alvan Ikokwu College of Education Owerri | 15 | 12 | **80** |
| 5. | Imo State Polytechnic Umuagwo | 6 | 4 | **67** |
| 6. | Federal College of Land Resources and Technology Owerri | 8 | 6 | **75** |
| **7.** | **Total** | **81** | **63** | **100** |

**No. Administered= 81; No. Returned=63; % of return rate=78**

Table 1 shows that 81 questionnaire were administered while 63 representing 78% were returned and found usable.

**Table 2: Types of Open Source Software Provided**

| S/N | Operating  systems | Frequency | Percentage |
|---|---|---|---|
| 1. | Windows | **63** | **100** |
| 2. | Linux | Nil | Nil |
| 3. | Mac | Nil | Nil |
|  | **Library management system** |  |  |
| **4.** | Koha | Nil | Nil |
| **5.** | Evergreen | Nil | Nil |
| 6. | New Genlib | Nil | Nil |
| 7. | Open biblio | Nil | Nil |
| 8. | Opals | Nil | Nil |
|  | **Module** |  |  |
| 9. | Acquisition | Nil | Nil |
| 10. | Cataloguing | Nil | Nil |
| 11. | Circulation | Nil | Nil |
| 12. | Serials Control | Nil | Nil |
| 13. | Online public access catalogue | 26 | 41 |
| 14. | Report Management | 26 | 41 |
|  | **Digital Library Software** |  |  |
| 15. | Dspace | 26 | 41 |
| 16. | Greenstone | Nil | Nil |
| 17. | Eprints | Nil | Nil |
| 18. | Fedora | Nil | Nil |
|  | **Website development software** |  |  |
| 19. | Joomla | Nil | Nil |
| 20. | Word press | 26 | 41 |
| 21. | Drupal | Nil | Nil |
|  | **Learning Management System** |  |  |
| 22. | Moodle | Nil | Nil |
| 23. | OLAT | Nil | Nil |
|  | **Open  source  electronics  resource  management  system software:** |  |  |
| 24 | Calibre | Nil | Nil |

Table 2 shows that majority, 63 (100%) of the respondents agreed that they use window operating system. This was followed by 26 (41%) of the respondents who agreed that they were provided with on-line public access catalogue; report management; Dspace and Word press respectively. On the other hand, the Table further reveals that majority 37 (58%) of the respondents indicated that they were not provided with open access software. Also the study revealed that out of the six academic libraries in Imo State only one has attempted partially an integrated library system.

**Table 3: Extent of use of open source services provided.**

| S/N | Extent of Use | Frequency | Percentage |
|---|---|---|---|
| 1. | Very high extent | 6 | 12 |
| 2. | High extent | 11 | 17 |
| 3. | Low extent | 17 | 26 |
| 4. | Very low extent | 29 | 46 |
| 5. | Total | **63** | **100** |

Table 3 reveals that majority 29 (46%) and 17 (26%) of the respondents indicated low extent use of open source software for library services. A paltry number of librarians 1(17%) and 6 (12%) found the extent of use of open source high. This result shows that open source technology is not effectively used for services in academic libraries in Imo State Nigeria

Table 4: Factors Militating Against the Use of Open Source Technology and Services

| S/N | Items | Frequency | Percentage |
|---|---|---|---|
| 1. | Lack of technological knowledge for its adoption | 58 | 92 |
| 2. | Lack of Internet facilities to download and use software | 50 | 79 |
| 3. | Low level of technical skills and ability of librarians | 48 | 76 |
| 4. | Fear of the unknown | 10 | 15 |
| 5. | Cost of Internet network | 48 | 76 |
| 6. | Data security | 30 | 47 |
| 7. | Lack of community support | 27 | 42 |
| 8. | Frequent power outage | 49 | 77 |
| 9. | Passive attitude towards the use of technology by management | 53 | 84 |
| 10. | Fear of replacement of software by a newer version | 42 | 66 |

Table 4 shows that majority, 58 (92%); 53(84%); 50 (79%) and 49 (77%) of the respondents agreed that lack of technological knowledge for its adoption; passive attitude towards the use of technology by management; lack of Internet facilities to download and use software; frequent power outage constitute the highest factors militating against the use of open source technology and services. These were followed by 48 (78%), 48(78%), 42 (66%) 27 (42%) and 30(47%) of those who indicated lack of cost of Internet network; low level of technical skill and ability of librarians; lack of community support; fear of replacement of software by a newer version; and security. 10(15%) fear of the unknown also is a constraints in the utilization of open source technology and services.

## 5.0. DISCUSSIONS

Table 2 reveals that only 26 (41%) use some types of open source technology in their library. This finding highlights the call of Uzomba, Oyebola and Izuchukwu, (2015) that academic libraries in Nigeria to embrace open source integrated systems and networked operations as the facilities provided by integrated library services go beyond the acts of traditional libraries, to the use of open source technology in services such as acquisition, cataloguing, circulation serials services and reports management. A table 3 shows that the extent of use of open source resources in academic libraries is low. This agrees with Sunil Kumar and Maharana (2012) findings that open source are not widely used in libraries because of lack of awareness and knowledge on the use of open source in academic libraries. Table 4 revealed that lack of technological knowledge for its adoption 58 (92%) in particular was a major factor militating against the use of open source technology. Ukachi (2012) corroborated this finding in a study that revealed that most librarians in Nigeria have limited awareness on the availability of the varying OSS hence, do not significantly utilize them in their libraries. This implies that most libraries in Nigeria are still not ready to embrace the current trend in the profession as it affects the adoption of Information and Communication Technology in their services provision. Similarly, most Librarians in Nigeria are not exposing themselves to the acquisition of skills necessary for 21st century librarians. Subsequently, this has continued to affect the services academic libraries they could offer.

## 6.0. CONCLUSION

The study discovered that the use of open source technology in information services is a mirage in academic libraries in Imo State. The adoption of open-source software represents flexibility and enhanced information service delivery. The free access equally is a good

alternative to proprietary software with a strong foundation that allows several different workflows and fits different types of libraries. It is vendor independence, compatible, adaptable, free/lower cost of installation and customisation opportunities. Moreover, it has the potential to develop further with global technical support and cooperation opportunities.

## 7.0 CONSTRAINTS

➢ Open source software is not easy to use due to variations in different models and might require specialized training

➢ Shortage of applications that runs on ops due to parallel developments and switching to ops involves compatibility of all other software used on proprietary developments

➢ Latest hardware are in competitions with the open source platforms so we have to rely on third party vendors

## 8.0 PROSPECTS

➢ Open source is free to modify and develop by nonprofit individuals which make it adaptable for developing county like Nigeria.

➢ It offers security because its code is easily accessible also a large community can produce secure and stable code

➢ It offers more opportunity for bugs fixes

➢ It is decentralized with open standards and no problem of incompatible formats

➢ No complex licensing models and does not need anti-piracy measures like activation or serial number

## 9.0. RECOMMENDATIONS

Academic libraries should key into the open source technology because it is free, reliable, stable, adaptable and supported by the global community. This is imperative for academic libraries in Nigeria to bring back their users.

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