

**Organizational Factors, Environmental Factors and Motivation to Use Open-Source
Software among University Library Personnel in Lagos State, Nigeria**

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Certification

This is to certify that this thesis was carried out by **Abiodun Michael SESSI** with Matriculation Number **LCU/PG/002553**, a student in the Department of Information Management under my supervision in the Faculty of Communication and Information Science, Lead City University, Ibadan, Nigeria.

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Dedication

This thesis is dedicated to God Almighty for His sufficient grace over my life.

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Even though the above-mentioned institutions and persons have assisted in the process of this research work, I alone stand responsible for the errors, if any, found in the work.

Abstract

Open-source software have caught the attention of libraries globally particularly, in developing countries where funding for library automation is a major challenge. However, the use of open-source software has not reached the expected level in Nigeria. This study investigates the influence of organizational factors, environmental factors on the motivation to use open-source software among academic library personnel in Lagos State, Nigeria. the study adopted a descriptive survey research method. The population consist of 198 library personnel from public and private universities in Lagos state. Total enumeration was used to select the sample. A structured questionnaire was used as the research instrument. The research reveals a moderately high level of motivation to use open-source software among the library personnel. Organizational factors are found to have a highly positive influence on motivation (Mean = 2.84). Environmental factors are conducive to open-source software use (Mean = 3.17). The test of hypotheses also revealed that organizational (Adj. $R^2= 0.206$, $p= 0.000$) and environmental factors result (Adj. $R^2= 0.170$, $p= 0.000$), individually have significant influence on motivation to use open-source software. In addition, both variables also have significant combined infouence on motivation to use open-source software among academic library personnel in Lagos state (Adj. $R^2= 0.246$, $F(2,187)= 11.096$, $p= 0.000$). The study concluded that the findings have significant implications for academic libraries, emphasizing the need for ICT training, strengthening regulatory frameworks, promoting collaboration, and conducting regular assessments to enhance the motivation for open-source software adoption. The study thus recommended collaboration among libraries and partnership with technology developer and regulators to further boost motivation to use of open-source among academic library personnel.

Keywords: Academic libraries, Open-source, Library Automation, Library technology, Capacity development, Lagos State.

Word Count: 266

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Chapter One

Introduction

1.1 Background to the Study

The use of open-source software in library routines has been promoted as a way for academic libraries to overcome various challenges facing library automation and bridge the digital divide. Academic libraries in Nigeria as well as other parts of the world have been negatively impacted by the speed of technological advancement with majority of them unable to catch up with the pace of technology which has affected the range and speed of services they can offer to their clients. Many academic libraries are now seen as relics that cannot meet the information needs of the modern information users due to their inability to integrate technology into their services and provide unrestricted access to information and knowledge as has been made possible by the emergence of Information and Communication Technology (ICT)¹.

The library, like all other organization is affected by technological revolution sweeping across the world. It is now widely accepted that any library that would operate effectively in the information age has to make use of various software for various purpose such as library management, digital resources management, research data management, digital references services, library cooperation and others. The use of all these software in the delivery of services is called library automation. The level of automation in any library is determined by the portion of its activities that is driven by various software. Achieving library automation has been a challenge for libraries in Nigeria due to high cost of proprietary software¹.

In the era of proprietary software, few libraries, especially in developing countries such as Nigeria, could afford the cost of automation. For one, the available software options were limited and their functionality was also limited and focused on the services rendered by foreign libraries many of which are often irrelevant to Nigerian libraries. However, the libraries could not customize these software which usually raise several usability issues. In addition, the cost implication for acquiring the necessary infrastructures to operate these software was very high.

Also, the yearly subscription for proprietary library software often proved too much for many libraries. Indeed, the first set of libraries to be automated in Nigeria were sponsored by the government and international donors. Once the funding dried up, the automation projects also stopped. In addition, many of the proprietary softwares only cater for one or two aspects of library routine service which means that a typical library has to subscribe to several softwares². In instances when each software comes from different vendor with different service agreements, managing the process can be challenging³. These problems were expected to be solved by the advent of open-source software.

Open-source software are software that are released free of charge, along with their source codes so that users can make use of them free of charge for various purposes. There are open-source software for virtually all library activities¹. Examples include library management software such as Koha, Greenstone, MylibPhp; institutional repository software such as Dspace, e-Print, and Fedora. There are also other software such as Zoom, Google Meet, Mendeley, and others that are useful for various activities in the modern library. Installing these software cost the library virtually nothing and there is no subscription fees unlike proprietary software⁴.

With the use of the various software outlined, Nigerian academic libraries can extend their services beyond the four walls of the library and provide library and information services to those students and staff who rarely visit the library but who are in need of quality information resources. The benefits that the use of software in the provision of library services offers is a great motivation to use the software by library personnel. However, scholars often measure motivation to use a technology by the perceived ease of use and perceived usefulness of the technology under consideration. This approach is more appropriate in examining the use of library technology.

The perceived ease of use of library technology refers to the perception of the library personnel about how easy the software will be in rendering the particular service. This is the subjective appraisal of library personnel who would use the software in carrying out various tasks in the library and in the provision of services to various categories of library users. The selling point of technology over the manual approach to library services is that automation makes services faster, easier and able to reach more people. Therefore, if the library personnel found that they can complete task faster, with lesser energy and without having to exert too much mental effort, then they may see the technology as easy to use⁵.

However, if the use of the technology requires drawn out procedures, complex processes and extensive training before it can be mastered, it would be perceived as difficult to use. The ease of use here is independent of the actual simplicity of the system, it is all about the perception of the library personnel some of whom are different in ICT skills, attitude towards technology and learning capability. It is therefore natural to find that some library personnel find a particular system easy to use while others find it difficult to use. If the perceived ease of use is positive, then it is assured that library personnel will use

the library software. However, there is another determinant of the motivation to use library software which is perceived usefulness.

Perceived usefulness of library technology refers to the perception of a particular library personnel about the usefulness of the technology they are being asked to use in their work. For instance, an OPAC system is supposed to expose the library holdings to the general public through the internet. However, if the OPAC system being recommended is found to be ineffective or just marginally better than the card catalogue, library personnel may reject such system until a better alternative comes along. Another example of perceived usefulness can be found in the Integrated Library Management System. There are some modules such as acquisition module that some libraries may consider useless because they rarely do online acquisition. Such library may therefore not use such module. Just as it is with perceived ease of use, perceived usefulness is also subjective. The fact that a library personnel finds a particular technology not useful does not automatically translate that it will not be useful to another library personnel.

Many scholars agreed that perception of ease of use and usefulness are good indicators that an individual or a group of people would be ready to make use of technology. A casual observation would reveal that more and more academic libraries and library personnel are positively perceiving the ease of use and usefulness of open-source library software in Nigeria. Even in case where some library personnel have negative perceived ease of use of some technology, the perceived usefulness is motivating them to make use of them. The use of these software has however not become widespread among all the libraries in Nigeria despite high level of perceived usefulness and perceived ease of use. This can be due to factors such as organizational and environmental factors.

Organization factors relates to multiple different factors concerning the organisation itself, including top management support, relevance to the library, to cost of ownership and boundary spanners. Individuals that connect their organisation with external knowledge and can introduce the organisation to fresh developments are boundary spanners. To analyse each element representing the organizational factors, boundary spanner are members of an organization, in this case, library personnel, who are in tune with developments in various fields and who often bring innovative ideas into the library. In the majority of organization including academic libraries, the adoption of open-source software is essentially a bottom-up endeavour, and the presence of boundary spanners is seen as crucial. This is not to say that library managers cannot be boundary spanners, but experience has shown that youth are more in tune with technological development than the elderly.

In many instances, young and early career library personnel possess knowledge and comprehension of open-source software and contribute in its implementation in the libraries where they work. Many of these young library personnel often become aware of the technical and financial benefits of open-source software which had a significant role in persuading and convincing them to spread the word inside the organisation. However, while the staff can recommend, the adoption of open-source software also depend on support from top management⁶.

Top management support is extremely important for libraries looking to create a competitive environment by applying technology to library operations. When lower cadre library personnel or middle level managers can promote the adoption of open-source software, the final decision will be determined by the type of support given by the library

manager who has to sell the idea to the management. Having the support of all level of management is the best way to overcome any internal barriers and resistance to change. It has been recognised that top management awareness of the potential benefits of open-source software is essential to manage potential organization change through an expressed vision and commitment, sending positive signals of confidence in the new technology to all library personnel⁷. However, in making their decisions, management would also consider the cost of ownership of the proposed software.

When making software adoption decisions, institution and library managers would consider the total cost of ownership (TCO). The TCO was shown to be proportional to technical benefits such as the dependability and performance of new software, as well as benefits such as low cost and freedom from vendor lock-in. However, management would also considers the fact that, while open-source software may be free, the infrastructure on which it will be run is not free. In addition, there may be the need to recruit technical experts since most open-source software do not come with after sale services. then there is the issue of training existing staff on the use of new system. In some cases, libraries also have to construct new buildings or modify existing space to accommodate the new services all of these have the potential to negatively impact TCO calculations. However, if the library is able to effectively proof the relevance of the new system, it may positively affect adoption.

Scholars have pointed out that institutions and library management have to be convinced of the importance and relevance of applying library software in their operations in order to adopt it. To explore open-source software adoption, all or majority of senior management must regard it as relevant to the organisation. Conversely, if they perceive

only disadvantages, they will surely reject it. In this instance, advantages such as the low cost of open-source software and the flexibility provided by developers which allows libraries to customise the software to suit their purpose. Management viewed the technical benefits of OSS adoption as more important for organization with large budgets. It was obvious that the advantages and disadvantages of OSS have an impact on whether or not senior management supports its implementation. Finding the appropriate personnel and having the essential skills to work with open-source are now two of the obstacles that prevent top management from supporting OSS adoption. The lack of ownership and lack of assistance are also disadvantages. Companies that had embraced OSS stated that the adoption was supported by upper management due to the decreased costs connected with it. When the organization factors are conducive, the environmental factors can also influence the adoption of open-source software⁷.

Environmental factors cover the inner ecology within which an academic library conducts its operations. Theorists have identified three types of environmental factors namely; competitive pressure, normative pressure, and regulators' pressure. The pressures come from various stakeholders in the environment in which academic library personnel operate. Competitive pressure relates to the intensity and pressure levels experienced by libraries from libraries and emerging information services providers such as the internet, publishers, bookstores and other libraries who compete with the library for patrons. These competitors can often force the library to see the importance of automating its services. No institution is willing to be left behind in the race for growth and development academic libraries are often pressured to acquire open-source software even when they have not totally understood its relevance to their services.

However, those libraries that have responded to the changes in their environment in this way have found several benefits from doing so. Through the adoption of open-source software, academic libraries can benefit from greater operational efficiencies and reduced cost that will boost patronage and enhance the reputation of the library. Additionally, academic libraries would adopt open-source software in order to achieve more accurate data collection and better understanding of the information environment in order to create new information products and services.

Libraries can also be pressured by the natural evolution of the information landscape to adopt open-source software. This is called normative pressure. It is the pressure to move with the time and remain relevant and compatible in a changing environment. Today, electronic information resources have become the order of the day. Libraries with limited collections can take advantage of several open access information resources online to meet the needs of their patrons. Academic library patrons include lecturers, students, researchers and other members of the university community. All of these groups of library patrons have diverse information needs which cannot be properly met by only the printed resources in the library. In addition, the common practice today is remote access to information resources.

Library patrons often work beyond library opening hours and they would need to access information resources irrespective of the time and their location. As stakeholders that the library aims to please, they may demand that the library provide services that require the use of various software⁸. These services include; Online Public Access Catalogue (OPAC) which provides remote access to library collections. There are also digital reference services such as synchronous and asynchronous services; current awareness services;

selective dissemination of information. etc. More specifically, library managers would also consider the requirements of organization such as the national university commission and other accreditation bodies and be pushed to adopt open-source software⁹.

The third construct of environmental factor is the regulatory pressure. Regulatory bodies for academic libraries in Nigeria include, the National University Commission (NUC), Library personnel Registration Council of Nigeria (LRCN) and various other regulatory and accrediting bodies related to various disciplines offered in a given university. All of these bodies and agencies often demand some level of automation from academic libraries without which they may not approve various academic programmes run in the university. When this type of pressure is in place, it is more likely for academic libraries to adopt open-source software than in a situation where no such pressure exists¹⁰.

The motivation to use open-source software in academic libraries is therefore underscored by perceived ease of use and perceived usefulness of these software. However, it is obvious that other factors are also in play. These factors are organization and environmental factors. While studies have been conducted on various factors to explain the use and non-use of open-source software in Nigerian academic libraries, scant attention has been paid to organization and environmental factors. This may prevent a holistic understanding of all issues affecting the use of open-source software in Nigerian academic libraries.

1.2 Statement of the Problem

The use of open-source software offers immense advantages to academic libraries. Academic libraries are established to enhance the tripartite function of the university

which are teaching, learning and research activities. The use of open-source software enhances library effectiveness in meeting the information needs of various categories of user by making the library accessible to the users and enable library personnel to serve more than one users at a time. However, despite the various advantages, the use of open-source software is not wider spread among library personnel in academic libraries.

This low usage of open-source software may mean that the library is still operating mainly on the manual mode which has negative implication for the library and library personnelhip as a whole. Rendering manual services deny users who may not be able to visit the physical library building the opportunity to access library services and collection. It can also lead to longer time in attending to users' needs. If this situation is not corrected, it may discourage the users from visiting the library which means the library is unable to effectively support teaching and learning going in the parent institution. In view of the consequences, researchers have examined various factors that may affect the use of open-source software. Among the factors considered include, awareness, ICT skills, perceived ease of use and perceived usefulness. However, there is a dearth of holistic studies that have considered environmental and organization factors in the motivation to use of library software. In order to fill this gap, the current study focuses on organization factors, and environmental factors and the motivation to use open-source software in academic libraries in Lagos state.

1.3 Aim and Objectives of the Study

The study aim to investigate the influence of organization and environmental factors on the motivation to use open-source software by library personnel in Lagos state. The objectives of the study are to:

- i. identify the level of perceived ease of use of open-source software by library personnel of academic libraries in Lagos State.
- ii. identify the level of perceived usefulness of open-source software by library personnel of academic libraries in Lagos State.
- iii. examine the organization factors in place in the academic libraries in Lagos State
- iv. examine the environmental factors affecting the use of open-source software by library personnel of academic libraries in Lagos State
- v. ascertain the influence of organization factors (management support, relevance to the library, total cost of ownership and boundary spanners) on the motivation to use open-source software by library personnel of academic libraries in Lagos State
- vi. ascertain the influence of environmental factors (competitive pressure, normative pressure, and regulatory pressure) on the motivation to use open-source software by library personnel of academic libraries in Lagos State.
- vii. ascertain the combined influence of organization factors and environmental factors on the motivation to use open-source software by library personnel of academic libraries in Lagos State

1.4 Research Questions

The following questions will guide the study;

1. What is the level of perceived ease of use of open-source software by library personnel of academic libraries in Lagos state?

2. What is the level of perceived usefulness of open-source software by library personnel of academic libraries in Lagos state?
3. What are the organization factors in place in the academic libraries in Lagos state
4. What are the environmental factors in place in the academic libraries in Lagos state

1.5 Research Hypotheses

The following hypotheses will be tested at 0.05 level of significance;

- Ho1 There will be no significant influence of organizational factors on the motivation to use open-source software by library personnel of academic libraries in Lagos State
- Ho2 There will be no significant influence of environmental factors on the motivation to use open-source software by library personnel of academic libraries in Lagos State.
- Ho3 There will be no combined influence of organization factors and environmental factors on the motivation to use open-source software by library personnel of academic libraries in Lagos State

1.6 Significance of the Study

The current study is significant because its findings will be relevant to library managers, library personnel, tertiary institutions in Nigeria and scholars. It will also contribute to

knowledge and enhance the theory and practice of library personnelhip in Nigeria. The study will be relevant for library managers as its findings will provide the empirical fact needed in advocating for management support for increased adoption of open-source software needed to provide 21st century compliant library services in Nigerian tertiary institutions. Specifically, the study will try to bring together the progress made by libraries in Lagos state in term of open-source software use, the gap needed to be filled and insights into effective strategies that can be adopted to move forward.

The study will also be of use to library personnel as its findings and recommendations will point the way on how library personnel can stimulate the adoption of open-source software even when management are yet to become aware of the latest relevant software. By analyzing the role of boundary spanners, that is, library personnel who keep themselves up to date about development in the technological world and how this affect the practice library personnel, others can also be inspired to take interest in technological innovations.

Tertiary institutions in Lagos and beyond will also benefit as the study aims to encourage innovative library services in tertiary institutions. It is expected that Libraries that implement the recommendations to be made at the end of this study will be able to improve their services which will be to the benefit of library users such as lecturers, students and researchers. Most importantly, this study will be a significant contribution to the literature on library software use in Nigeria. This is because it focuses on factors which are rarely examined by other researchers in Nigeria.

1.7 Scope of the Study

The subject scope of the study focuses on the influence of organization and environmental factors on the motivation to use open-source software by library personnel in Lagos State. The dependent variable is motivation to use open-source software which will be measured by perceived ease of use and perceived usefulness of open-source software. There are two independent variables. The first is organization factors. This variable will be measured by metrics such as management support, relevance to the library, organization readiness and boundary spanner. The second independent variable is environmental factors. This variable will be measured by competitive pressure, normative pressure, and regulatory pressure. The two independent variables were anchored on the Technological, Organization, and Environmental (TOE) framework.

However, this study will focus on environmental and organization factors because they are not often examined in relation to the use of open-source software. Also, they are highly relevant factors that should be examined in the use of open-source software in Nigeria. The study will focus on all tertiary institutions in Lagos state. Data will be collected from library personnel, both professional and para-professionals, in the libraries. The mentioned cadres of library personnel will be focused on because of limited number of library personnel and also because technology-related tasks in academic libraries are now being carried out by both professional and para-professionals in the library.

1.8 Limitation to the Study

The researcher encountered certain limitations in the course of the study. One major limitation is the busy schedule of some of the library personnel which makes it difficult for them to fill and return the questionnaire on time. However, the limitation was overcome through the persistence of the researcher and support of appointed research assistants.

1.9 Operational Definition of Terms

Motivation to Use: this is the willingness of library personnel of academic libraries in Lagos state to make use of relevant open-source software in carrying out library services.

Perceived Ease of Use: this is the subjective judgment of library personnel of academic libraries in Lagos state regarding how easy or difficult it will be to make use of relevant open-source software in carrying out library services

Perceived Usefulness: this is the subjective judgment of library personnel of academic libraries in Lagos state regarding relevance or the ability of relevant open-source software to help them in carrying out library services

Environmental Factors: Environmental factors cover the inner ecology within which academic libraries in Lagos state carry out their operations

Management Support: this refers to the financial and other support provided by management to academic libraries in Lagos state carry to encourage them use open-source software

Relevance to The Library: this is the perception of library personnel of academic libraries in Lagos state that a particular open-source software is can be applied to certain library services.

Organization Readiness: this indicates the policies and practices existing in academic libraries in Lagos state that prepare them to accept and use open-source software for carrying out library services.

Boundary Spanner: these are particular library personnel of academic libraries in Lagos state who are conversant with latest development in technology and inform others about the relevance of certain software to library services.

Organization Factors: these are specific characteristics and peculiarities related to each academic libraries in Lagos state and which determine the motivation to use open-source software for carrying out library services

Competitive Pressure: this refers to the activities of competing information services providers which motivate academic libraries in Lagos state to use open-source software for carrying out library services

Normative Pressure: this refers to the development in the field of library personnelhip and the information environment which motivate academic libraries in Lagos state to use open-source software for carrying out library services

Regulatory Pressure; this refers to the demand of regulatory bodies which compel academic libraries in Lagos state to use open-source software for carrying out library services

Library Personnel: this refers to both professional and para-professionals employed in academic libraries across Lagos State.

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Chapter Two

Literature Review

The chapter presents the review of literature related to the current study. the review focuses on literature on the use of open-source software issues relating to the use of open-source software in academic libraries. The chapter is organized under the following headings and subheadings;

2.1 Conceptual Review

2.1.1 Motivation to Use Open-source Software

2.1.2 Organization Factors in Tertiary Institution Libraries

2.1.3 Environmental Factors in Tertiary Institution Libraries

2.2 Theoretical Framework

2.2.1 Stimulus Theoretical Framework

2.2.2 Technological, Organizational and Environmental (TOE) Theoretical Framework

2.3 Review of Empirical Studies

2.3.1 Organizational Factors and Motivation to Use Open-source Software

2.3.2 Environmental Factors and Motivation to Use Open-source Software

2.4 Conceptual Model

2.5 Summary of Literature Reviewed

2.1 Conceptual Review

2.1.1 Motivation to Use Open-source Software

Computer software are set of instruction or programmes expertly designed to carry out various tasks. They are like the soul of the computer hardware as the most basic operation of a computer is driven by a particular software. In the early period of the computer, software are ubiquitous in that they came with the computer and helped in the limited tasks that the computers of the time could perform. However, as the power and functionalities of the computer grew, various computer software dedicated to carry out specific tasks such as account, calculations and others emerged. The early software were proprietary in the sense that they are offered for sale or subscription and only those with can pay were able to use them. All control of the software is retained by the developer and/or the copyright owners.

Open-source software is the exact opposite. Free and open-source software (OSS) is software that has had its source code made public so that it can be used, modified, and adopted by anyone. Despite the differences in their nomenclature, free software (FS) refers to the same thing: computer programmes for which the source code is freely available to users, who may then modify, run, and redistribute it without licencing restrictions. Despite ideological differences among their developers and advocates, OSS and FS, also known as FOSS or simply OSS, have played a transformative role in the development of information societies in both the developed countries of the Western hemisphere and the developing countries of Asia, South America, and parts of Sub-Saharan Africa¹

Open-source software developed by an individual, group or organisation and made available for free to anyone with internet access. Unlike what is obtainable in the use of

proprietary software, users of open-source software do not need any special permission to download, run, copy, distribute, study, change, share and improve the software for any purpose². The concept of open-source software (OSS) has its roots in the philosophy of free software, which was developed in the 1980s by computer programmer Richard Stallman. Stallman believed that software should be freely available and that users should be able to access and modify the source code for any software they use³.

In the late 1980s, Stallman founded the Free Software Foundation (FSF), an organization dedicated to promoting the use of free software. Around the same time, he also developed the GNU operating system, a free software alternative to proprietary operating systems like Unix and DOS. This laid the foundation for open-source movement which is a loose assembly of software developers who seek to change the world through the creation of software that can solve many of the problems facing people around the world. This philosophy is based on the belief that software is a common good that should be shared and improved upon by a community of users, rather than being treated as a proprietary product that is owned and controlled by a single company or organization.

In 1998, a group of people proposed the term open-source software (OSS) as a replacement for free software since it was less vague and more familiar to business. Open-source software licences allow anybody to use, modify, and redistribute computer programmes under the same terms as the original developers. In general, anyone is free to modify open-source software, adapt it to run on different platforms or use different chip architectures, distribute it to others, or sell it. Open-source aims to make a product more commercial by making it more accessible, intelligible, adaptable, and/or replicable. In 1998, software developer Christine Peterson came up with the term "open-source

software" as a way to define the free software movement that would be more appealing to corporations. In the same year, the Open-source Initiative (OSI) was established to standardise OSS licences and encourage their widespread use. Since then, OSS has skyrocketed in popularity, finding uses everywhere from operating systems to productivity apps to scientific and technical instruments. The advantages of utilising and contributing to open-source projects have been recognised by a growing number of businesses and organization, which have so embraced OSS.

Notably, the Open-source Definition establishes an open-source mindset and defines a boundary on the usage, modification, and redistribution of open-source software. A user may be granted permissions to use the software that would be illegal under copyright laws without a software licence. These include the freedom to reuse, alter, and distribute the work. The Open-source Definition has been met by a number of open-source software licences. The most well-known instance of this type of licence is the GNU General Public License (GPL). While open-source provides a mechanism for generally making a product's source code available to the public, open-source licences allow authors to restrict access as they see fit.

In response to Netscape's January 1998 announcement of a source code release for Navigator, a Palo Alto-based strategy session coined the term "open-source " (as Mozilla). Todd Anderson, Larry Augustin, John Hall, Sam Ockman, Christine Peterson, and Eric S. Raymond were among the others in attendance. Before releasing Navigator's source code, they took the chance to address a possible misunderstanding that could have arisen due to the word's double meaning in English. This meeting is widely regarded as the starting point of the "open-source " movement. However, many argue that the open-source

movement began with the introduction of the Internet in 1969, while others blur the lines between open-source and free software. Established in 1985, the Free Software Foundation (FSF) meant "free" to refer to the right to freedom of expression rather than a free beverage. Since much free software was (and is) gratis, its very name became synonymous with "free," which was seen as anti-commercial⁴.

The philosophy of open-source software (OSS) is centered around the idea that software should be freely available and that users should be able to access and modify the source code for any software they use. One key principle of open-source is the transparency in the software development process. Access to the source code is a precondition for this. The source code of all open-source software is available so that anyone who is able can see how they were developed. According to the Open-source Initiative (OSI), the philosophy of OSS is enshrined in the freedom of software users to run any software they download as they wish for any purpose provided such does not contradict any in their place of residence on the in the cyberspace. The philosophy also demand that people should be given the freedom to study how the program works, and change it so it serves their computing purposes.

The philosophy guiding open-source movement also dictates that OSS licenses must not discriminate against any person or group of persons, or against any field of endeavor. This means that OSS can be used by anyone, for any purpose. In addition, the OSS licenses must be included with any distribution of the software, so that users are aware of their rights and obligations. License must not be specific to a product: OSS licenses must not be specific to a particular product. This means that the license must apply to any

product that uses the OSS, regardless of the product's name or the company that produces it. In addition, License must not restrict other software: OSS licenses must not place restrictions on other software that is distributed with the OSS. This means that users are free to use other software in conjunction with the OSS, as long as they comply with the terms of the other software's license.

Open-source software also gives individuals and organization the freedom to redistribute software in a non-profit manner. As open-source software are not developed with commercial intent, it is unethical to package them for sale but it is allowed to share them among other users for free. For instance, library boards can share a particular software among other libraries under their jurisdiction in an attempt to enhance library services. This GNU license common to open-source software also allow the freedom to distribute copies of modified versions of open-source software to others. With the source code freely available, other programmers can customize, augment, enhance and modify particular software to meet specific purposes. This can then be made public so that others can use the modified version if it is relevant to them. By doing this, developers aim to provide the whole community a chance to benefit from your changes.

The OSS philosophy is based on the idea that collaboration and sharing can lead to the creation of better software that meets the needs of a diverse group of users. This is in contrast to proprietary software, which is typically developed and controlled by a single company or organization and is only made available to users under restrictive terms of use. Open-source developers create communities and wikis through which they make their work public. Other developers can contribute to an existing project or a group of developers can start a project, carrying along developers from all over the world who are

able to make contribution and ultimately ensure the quality of the final product. The philosophy behind open-source software is highlighted in the characteristics of open-source software and the open-source development process.

Open-source software (OSS) has a number of characteristics that distinguish it from proprietary software. The most prominent is the availability of source code. One of the main characteristics of OSS is that the source code is made available to users. This allows users to access, modify, and distribute the software as they see fit, within the limits of the OSS license. This is not possible in proprietary software as the source is the best chance for developers to retain control of the software they develop and to earn profit from its use. However, since the intent of open-source software developers is not to make profit, they usually release the source code effectively relinquishing control of the software. However, the altruistic nature of open-source software development has created a community and a sense of collaboration.

OSS is typically developed and maintained by a community of volunteers, rather than a single company or organization. This allows for collaborative development, where users can contribute to the project and suggest improvements or bug fixes. A lot of online communities have emerged for the development of open-source software and these communities often remain to provide support services to users of open-source software. This support community is highly essential because the technical support which usually comes with proprietary software is not available for open-source software and users would have been left stranded without these communities.

Because of the community approach to the open-source software development, there are no restrictions on use. This means that OSS can be used freely by anyone, without the

need to pay license fees or comply with restrictive terms of use. This include any update or new version of the software. The freedom to use also include the right to use any of the customized version of the software which may be issued by other developers apart of the original developers of a particular software. This is most significant to institutions such as libraries that have gad to grapple with vendor lock in which means that they could not modify or add useful plug ins from other vendors which could have enhance the performance of their software. Open-source software eliminates this challenges as they can be modified using codes from other software and be made to look or work just the way that suits them. Unlike proprietary software, OSS users are typically allowed to modify the source code as they see fit, as long as any modifications are also made available under the same OSS license.

It is important to note that while OSS is freely available, it is not necessarily free of charge. Some OSS projects may require users to pay a fee in order to use the software, and some OSS licenses may request that users pay a fee if they distribute the software commercially. However, the cost of using OSS is often much lower than the cost of using proprietary software, and many OSS projects offer a range of pricing options to suit different needs and budgets. OSS has become increasingly popular in recent years, and it is used in a wide range of applications, including operating systems, productivity software, and scientific and engineering tools. Some well-known examples of OSS include the Linux operating system, the Apache web server, and the Firefox web browser and many more.

The advent of open-source software has been hailed by organization and institutions as a game changer in the quest for rapid development and advancement of technology. It is

also sees as an opportunity for small businesses and developing countries to have access to functional software capable of driving micro and macro-economic development globally⁵. The academic libraries is one of institutions for whom open-source software hold great potentials. There are several advantages of using open-source software (OSS) for academic libraries⁶:

The major hindrance for software adoption in Nigerian libraries is the expensive nature of acquisition and maintenance of proprietary software. As OSS is typically free to use, it can help libraries save money on software and hardware expenses. Open-source solutions generally require no licensing fees. This also mean that there is no compulsory annual maintenance fees to be paid. The only expenditures are for media, documentation, and support, if required. In addition, implementation of OSS often require minimum expenses on hardware costs. majority of open-source solutions such as Linux often require less computing power as they are designed to be compact and portable. As a result, the library will invest on less hardware to accomplish the same tasks as on conventional servers (Windows, Solaris) or workstations. The result is you can get by with less expensive or older hardware⁷.

The license management for OSS is also very simple. This is because the license agreement was made simply to clarify basic ethical issues surrounding the responsible use of the software. Once libraries agree to the license, it has covered all subsequent use. For instance, they would require no additional permission to modify the software, upgrade it or share it with other libraries all of which they must do if they are using proprietary software. The simple license agreement designed to help the users also means

that libraries do not have to worry about signing agreements that will come back to haunt them in the future.

Another advantage of using OSS for libraries is the freedom to customize the software to meet their needs and to reflect their brand personality. Because OSS source code is available to users, libraries can customize the software to meet their specific needs. This can be particularly useful for libraries with unique requirements or for those that want to integrate the software with other systems. For instance, some libraries offer peculiar services which is not common to others. Some terms used in the software to describe certain process or services may also be different from what a particular academic library wants. Also, some libraries are offering limited services. Each library can therefore decide on how much of the functionalities of the software it wishes to enable. They can also customize the interface to reflect their preferred colour, font style decide which service or information is given prominence on the interface⁸.

Open-source software such as Koha and Dspace allow these customizations for libraries. Koha comes with various modules but libraries can decide which of the modules they wish to use. In addition, while it provides for both standard/expanded and simple templates, it also provides the opportunities for libraries to remove unwanted fields, rename field and moves fields around to suit their purposes. On the part of Dspace, it allows users to create collections and communities to suit their needs. This means that it is entirely up to each library to decide how its repository looks. Some libraries have also customized their user interfaces that a casual browser would find it difficult to know the

software used to create the repository. Another important advantage is that OSS users are not left on their own by software developers.

There is a great community support for OSS users all over the world. This is made possible because OSS is often developed and maintained by a community of volunteers, which means that there is a large user base that can provide support and assistance with any issues that may arise. Indeed, it has been argued that the support available for OSS users is often superior to what proprietary software developers can offer. First, open-source support is freely available and accessible through the online community via the Internet. In addition, there are many technology solution providers who are now supporting open-source with free online and multiple levels of maintenance issues for a fee. One of such is Liblime in the UK and ProjektLink in Nigeria both of which focus on OSS installation and maintenance for academic libraries⁹.

Another advantage of OSS use is interoperability which is the ability of various software to operate together on the same platform or share data and information without the need for any conversion. OSS is often designed to be interoperable with other software and systems. Specific open-source technologies such as CIM (Common Information Model) and WBEM (Web Based Enterprise Management) provide the capability to integrate or consolidate server, service, application, and workstation management for powerful administration. This can save academic libraries a lot of stress when changing systems or thinking of expansion to existing systems. It also eliminates the need to invest on different servers and enhance the efficiency of library operations. This also raises the issue of security.

OSS is often more secure than proprietary software, because the source code is open and available for review by anyone. It allows various software developers to scrutinize the security protocol and identify vulnerability which can be either fixed or guard against¹⁰. While there has been issue regarding the security of data on open-source software, any data breach experienced is more likely to be a result of weakness of the software which can subsequently be fixed by members of the community¹¹. It is noted that, even proprietary software are not totally immune from security issues and software vendors driven by profit can also exploit loopholes in the service agreement to harvest data of subscribers.

OSS are more assured of sustainability in the long run. The sustainability of OSS has been one of the criticisms promoted by proprietary software supporter. However, since OSS is not tied to a single company or organization, it is less likely to become obsolete or unsupported. The fact that the source code has been released to the general public means that if the original developer stops providing support, others can take up the challenge. This can help to ensure the long-term sustainability of the software for the library. Indeed, majority of the open-source software for libraries such as Dspace, Eprint, Koha, VuFinder, and other have proven far more resilient than the proprietary, profit-oriented software developers they replaced. Also, more large software developers such as IBM, Microsoft and Apple to mention a few are now releasing open-source software. This has even led to OSS creating quality software.

Evidence and research indicate that open-source software is as good as proprietary software and sometimes better¹². The 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. The constant scrutiny and modification to OSS has led to robust software which have been applied to various aspect of library services. Some of these software that have become household names in academic libraries across the world today include, KOHA, E-Print, Dspace. There are also other OSS platforms such as Drupal, Joomla, all of which has continued to be relevant among software developers.

Perhaps the most important advantage of open-source software for academic libraries is its scalability. Linux and open-source applications and services designed to be scalable. Multiple options for load balancing, clustering, and open-source applications, such as database and email, give organizations the ability to scale up for new growth or consolidate to do more with less. Libraries, their collections, and services are always growing. OSS offers the opportunity to simply upgrade the existing system when the capacity of any software is reaching its limits. This saves a lot of resources and energy that would have been expended on converting to a more robust system¹³.

Open-source software has become the preferred option for many libraries. As one of the earliest open-source library solutions, Koha was initially developed in 1999 on the Linux OS, the MySQL database programme, and the Perl programming language for online integration and network tools. PHP, MyLibrary, OpenBiblio (library management system), Greenstone (digital library software), Mambo, eZpublish, Plone (content management system), Moodle, Spaghetti learning, Claroline (courseware tools), Open Journal System (online journal publishing software), Eprints, and Dspace are all examples of popular open-source software that can be used in libraries. Most library-focused open-source software is compatible with multiple platforms, including Windows,

Linux, and Mac. Open-source software is one alternative now chosen by libraries due to its copying, modifying, and distributing capabilities, lack of licensing constraints, and potential interaction with other programmes. Thanks to its low price, adaptability, availability of source code, and no-strings-attached redistribution, open-source software is becoming increasingly popular around the world⁷.

There are many types of open-source software (OSS) that academic libraries can use, depending on their specific needs and requirements. Some common examples of OSS for academic libraries include: library management systems, digital asset management systems, learning management systems, research data management systems, office productivity software, scientific and engineering tools, and digital signage software among others. The use of these software is non-negotiable in a modern academic library and without the OSS version of these systems, many libraries will be severely constrained in the scope of services they can render to their clientele^{14, 15}.

Library management systems: These systems are used to manage the catalog, circulation, and other aspects of the library's collection. Examples include Koha, Evergreen, and Aspen. Many libraries throughout the world have adopted Koha, an open-source ILS (integrated library system) that has many useful features. An integrated library system (ILS) is software that helps library personnel carry out routine library activities, including patron checkouts, collection management, and materials purchased. Koha is a great alternative to proprietary ILS for libraries who cannot afford to buy, instal, and maintain one. Koha was developed in accordance with OPAC (open public access catalogue) standards and library ILS specifications. Koha also does not force libraries to use a specific vendor, so they can get technical help from anybody they like.

Another open-source ILS is NewGenLib. This is an Integrated Library Automation and Management System. It was invented in India by researchers at the Kesavan Institute of Information and Knowledge Management and Verus Solutions Pvt Ltd. The first version (NewGenLib 1.0) was released in March 2005, and further revisions 2.0 and 2.1 have since been made available. Verus Solutions Pvt Ltd. of Hyderabad, India, announced on January 9, 2008, that NewGenLib is Open-source Software licenced under the GNU General Public License.

When looking into open-source ILS alternatives, Evergreen is another choice to consider. Equinox Software's Evergreen is a dependable, enterprise-level ILS solution made to withstand the rigorous use of huge libraries. Because it is open-source, it is not proprietary and may incorporate any changes made by the community; some of its characteristics include standard compliance, the OPAC interface, and flexible administration and workflow modification¹⁶.

Digital asset management systems: These systems are used to manage and preserve digital content, such as research papers, images, and videos. Examples include Fedora, e-prints, DSpace, and Greenstone. Greenstone Digital Library Software is a free and open-source software option for creating and displaying digital libraries, Greenstone is also used to manage digital archives. It's great for creating collections with powerful full-text searching and user-friendly, visually appealing, metadata-based browsing. They are very simple to repair, and can be automatically improved upon and reconstructed¹⁷. There is room for growth in the system, since new "plugins" can be developed to handle new kinds of documents and metadata. Users, especially those in educational and public

service institutions, will benefit from the Greenstone programme because it will allow them to create their own digital libraries.

Dspace is a state-of-the-art digital institutional repository that gathers and makes accessible the digital works produced by a university's research faculty. To discover and recover digital goods, it organises and distributes the metadata that describes them. Digital files are the building blocks. DSpace was created by the library staff of the Massachusetts Institute of Technology (MIT) and HP (HP). In order for institutions and organization to manage DSpace with limited resources, it was developed as an open-source application.

It helps ensure that the digital content in the archive will be accessible for years to come. It's also made to be simple to give in to. Digital content can be uploaded, organised, and accessed with the help of DSpace.

Eprints is a free and open-source software suite for developing OAI-compliant metadata harvesting open access repositories. It is generally used for institutional archives and scientific journals, but it has many characteristics with Document Management systems. The University of Southampton's School of Electronics and Computer Science is responsible for developing and releasing EPrints under the GNU Public License.

Fedora is open-source software that provides businesses with a versatile service-oriented architecture for handling and distributing their digital assets. A robust digital object model is at its heart, allowing for many perspectives on data and its connections. Locally controlled content or remote content can both be encapsulated in digital objects. Associating web services with objects enables dynamic views. The infrastructure of a repository houses digital objects and allows for multiple types of administration. Fedora

provides full web service exposure for all object and repository-level operations. Fine-grained access control policies can shield these capabilities. Fedora's distinctive set of capabilities makes it a desirable option for use in many settings. Fedora is the foundation for a wide variety of useful applications, such as library cataloguing and cataloguing software, multimedia creation environments, archival repositories, institutional repositories, and educational digital libraries. In addition to digital resources management systems, libraries also manage learning management systems.

A learning management system (LMS) is a software application or web-based technology used to plan, implement, and assess a specific learning process. Typically, a learning management system provides an instructor with a way to create and deliver content, monitor student progress, and communicate with students. Some examples of learning management systems include Blackboard, Canvas, and Moodle. These systems can be used to deliver online courses, as well as to supplement traditional classroom-based courses by providing additional resources and materials for students. Academic libraries may use learning management systems (LMS) in a number of ways, which includes delivery library instruction and information literacy training to students and faculty.

Libraries may use the LMS to create and deliver online tutorials, workshops, and other instructional materials. They can also use LMS to manage and distribute electronic resources, such as e-books and electronic journals. Libraries may use the LMS to provide access to these resources and track usage statistics especially in this era when tertiary institutions are shifting to blended learning which incorporates remote learning with on-site, physical classroom learning. They can also use the LMS to support faculty in the creation and delivery of online courses. Libraries may work with faculty to incorporate

library resources into LMS course materials, and may also provide training and support for faculty as they use the LMS to teach online.

Another use of LMS in academic libraries is to host online exhibitions and other digital collections. Libraries may use the LMS to create and display digital exhibits, as well as to provide access to other digital resources such as archival collections and images. Overall, the use of LMS by academic libraries can help to support teaching and learning on campus by providing access to a wide range of resources and instructional materials. In institutions where the management of the institutional LMS is not the responsibility of the academic library, academic libraries still play significant roles in the use of LMS¹⁸.

Academic libraries can play a number of roles in the use of learning management systems (LMS) on their campuses. Some of the ways that academic libraries may be involved in LMS include: Providing support and training for faculty and students on how to use the LMS and its various features. Collaborating with faculty to incorporate library resources, such as electronic databases and e-books, into LMS course materials. Offering workshops and other instructional sessions on using the LMS to effectively teach and learn online. Developing custom guides and tutorials to help faculty and students get the most out of the LMS. Working with the IT department to troubleshoot technical issues with the LMS and ensure that it is running smoothly¹⁹.

Research data management systems: Research data management systems (RDMS) are software tools or platforms that are used by academic libraries to manage, store, and preserve research data. These systems may be used by researchers to store and organize their data, as well as to share and publish their data with others. There are many different types of RDMS available, and the specific features and capabilities of these systems can

vary widely. Some common features of RDMS include Data storage and organization: RDMS may provide researchers with a secure place to store and organize their data, as well as to manage data access and permissions.

Data preservation: RDMS may include tools and services for preserving data over the long-term, such as through the use of digital preservation strategies. Data sharing and publication: RDMS may provide researchers with the ability to share their data with others, either through public repositories or through private sharing with specific individuals or groups. Data analysis and visualization: Some RDMS may include tools for analyzing and visualizing data, such as statistical analysis software or data visualization tools. Overall, RDMS can be an important resource for researchers in academic libraries, as they provide a way to manage, preserve, and share research data in a secure and organized manner. Examples include Zenodo, figshare, ResearchGate, CKAN, and Zenodo.

CKAN is an open-source RDMS for managing and publishing open data. It is used by governments, research institutions, and other organizations to share data with the public. Zenodo is an open-source RDMS for sharing, preserving, and citing research outputs, including data. It is operated by CERN, the European Organization for Nuclear Research. Overall, these open-source RDMS provide researchers with a range of options for managing, preserving, and sharing their research data in an open and transparent manner. Many academic libraries will be able to enhance their services with the use of the open-source software.

Other open-source software relevant to academic libraries include, office productivity software such as LibreOffice, OpenOffice, and Google Docs. that are used in word

processing, spreadsheet creation, and presentation creation. Libraries also use or make available Scientific and engineering tools such as R, Python, and MATLAB that use software for tasks such as data analysis, visualization, and simulation. In carrying out their own marketing or promoting other activities in their parent institutions, libraries can make use of digital signage software. This software is used to create and manage digital signage displays, such as those used for wayfinding or event promotion. Examples include Screenly, Rise Vision, and Concerto.

Academic libraries in the modern era are expected to make use of various library software to enhance their processes and deliver cutting edge services that meet the need of the modern information uses. For instance, academic libraries can make use of an integrated library system to place orders, acquire resources, accept payments, catalogue them for circulation, track their circulation, and shelve them. However, the use of any software is motivated by various factors. For effective library services, there is a need for dependable and high-quality software that can work well with the operating systems of the computers in libraries in Nigeria in order to optimise the advantages of ILS.

Academic libraries expect that software executed on the operating systems of their computers would work properly with little or no hiccups. Experience has revealed that choosing the incorrect library software causes issues for a large number of libraries in Nigeria. When considering whether to make use of a library software, libraries and library personnel consider both the system's performance and efficiency as well as its inherent flexibility to quickly adapt to changing customer demands and needs. There are two types of library software: proprietary software (that requires a subscription fee to use)

and open-source software (OSS). The most potent motivation to use open-source software among libraries and library personnel come from the perceived ease of use and perceived usefulness

It is claimed that the perceived usefulness, necessity, functionality, and usability of the new technology govern the behavioural intents of individuals to accept the technology. For instance, the belief of end users regarding the utility of a new information technology may change their fondness or attitudes toward embracing the new technology. While a good or negative perception of the technology's efficacy would determine whether or not it is adopted, the intention to embrace the technology would be determined by whether or not it is viewed. With the level of technological advancement all over the world and the opportunity to adopt open-source software for academic with limited funding, every library all over the world is expected to make use of technology to enhance their services. however, the reality is always different.

A survey of African countries' libraries conducted found that out of 40 libraries questioned, the vast majority have not yet completed the process of automating their services while others have abandoned the project. Many libraries have not yet completed their cataloguing and data entry aspect necessary to create a database of their holdings. Others have done this but they have been unable to move on to other processes. Also, study showed that public libraries in Botswana, Ghana, Kenya, Malawi, Nigeria, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe had low rates of computer information and communication technology (ICT) and other facility use, which was a major barrier to the automation of their services.

When compared to other African countries like Egypt and South Africa, Nigeria's state of information and communication technology (ICT) is far worse, making the situation in many university libraries there much more dire. Adoption of technology and relevant software in libraries is still in its infancy despite numerous efforts by the federal government, including the management information system (MIS) and Nigeria Universities Network (NUNET) projects, and the Nigerian virtual library project for higher institutions sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 2003. The low uptake of open-source software for library automation in among academic libraries, particularly Nigeria, has led scholars to suggest that motivation to use open-source software may be due to perceived ease of use and perceived usefulness of the software.

Perceived ease of use, is the extent to which a potential technology users anticipate minimal effort required to make full use of such technology. It is the degree to which an individual perceives a technology to be easy to use. a technology, which in turn leads to an individual's intention to use the technology. When a technology is perceived as easy to use, individuals are more likely to form positive attitudes towards it and are more likely to intend to use it. This is related to the motivation of library personnel to make use of open-source software. When library personnel are of the opinion that software will be easy to use, they are motivated to use. Overall, perceived ease of use plays a critical role in determining how well a technology will be adopted and used by individuals. This is why it is important to consider perceived ease of use in the design and development of new technologies, as well as in the evaluation of existing technologies.

The easier to use a technology is perceived to be, the more likely it is to be adopted and used. From the perspective of behavioural choice theory, users typically attempt to do the bare minimum to achieve their goals²⁰. People's initial impressions of a technology's usability are shaped by their preconceived notions about the way that technology is likely to be put to use²¹. Study show that the perceived ease of use is a function of the user's evaluation of the effort required to embrace and master new technology²². Perceived simplicity of use is believed to play a significant role in reducing the uncertainty of innovations, which in turn encourages individuals to adopt the technology in issue²³. Potential users of a technology will be hesitant to adopt new technologies due to the perceived complexity and risk associated with understanding them. This meant that an assessment of the time and effort needed to accomplish the goal was necessary²⁴.

Library personnel can determine how much time and effort they want to put into each responsibility. Therefore, if all other circumstances remain constant, library personnel are more likely to adopt a software that they view as being easy to use. As a result, in most cases, an open-source software's chances of being adopted increase if it is user-friendly and requires little or no effort on the part of its end users. In addition, past studies have shown that the perceived ease of using information technology (IT) applications affects actual utilisation and library automation uptake²⁵.

Indeed, the definition of library automation" refers to any process in which a machine, such as a computer, performs a task without requiring human intervention thereby easing the burden of humans. Automation not only improves quality, accuracy, and precision but also reduces costs by eliminating the need for human labour, as well as energy and resources. in line with this library personnel expect the use of software in library services

provision to improves library services by making it easier for library personnel to do a wide variety of jobs and so making library contents more accessible to readers²⁶. This is in line with the findings of a scholar who found that automation facilitates access by allowing users to do searches both locally and remotely using such search items as author, title, subject, call number, and keyword²⁷.

The adoption of circulation software for instance is expected to eliminate the need for tedious paperwork when borrowing and returning borrowed books. According to the research, people no longer need to fill out charge sheets when borrowing books; instead, they may simply scan the barcodes on the volumes. Application of relevant software to library operations is an important part of meeting the demands imposed on academic libraries since it makes use of technology to streamline routine tasks with the goal of bolstering the educational and research goals of its sponsoring organization²⁸.

With the available of various software relevant to library services, both the library staff's time and effort spent on managing the library's systems, operations, and services, and the users' time and effort spent gaining access to the library's resources, are greatly reduced²⁹. For instance, the online public access catalogue (OPAC) has made library resources accessible from diverse angles without much trouble, which is the case in traditional library operations³⁰. However, these are all theoretical, software must be actually perceived by library personnel that it is useful before they can make use of it.

Perceived ease of use is also related to the perceived ease of use of similar technologies, as well as the individual's prior experience with technology. Individuals who have had positive experiences with similar technologies in the past will be more likely to perceive a new technology as easy to use. In the analysis of perceived ease of use in Technology

Acceptance Model (TAM), it is important to consider the different factors that can influence an individual's perception of ease of use. These factors include the technology's design, user interface, and the level of training or support provided. By identifying these factors, researchers and designers can improve the perceived ease of use of a technology and increase its chances of being adopted and used by individuals.

In view of this any attempt to gauge the motivation to use open-source software must examine the underlying factors relating to perceived ease of use. It is instructive to evaluate library personnel in the context of their organization and environments. In term of organization, it is important to evaluate the training available to library personnel towards effective use of technology. It is also important to determine whether the library personnel has the required level of technical support from their organization or elsewhere. Further, the environment should be considered. The perceived ease of use for someone operating in an environment with high level of technology use that someone in an environment where the use of technology is rare. In essence all these will help determine the perceived ease of and the likelihood of library personnel adopting the use of open-source software.

The concept of perceived usefulness was initially meant to refer to job-related productivity, performance, and effectiveness³¹. Therefore, the amount to which a user believes that employing a particular system would influence his or her job performance and productivity positively is what experts calls "perceived usefulness". From a theoretical standpoint, people's purpose to act precedes their actual conduct, and that the perceived usefulness of and attitudes towards open-source software are the key motivation for library personnel to make use of these software.

Many scholarly works that highlight the significance of perceived usefulness in adopting new technologies^{32, 33, 34}. Perceived can therefore motivate library personnel to make use of open-source software. Library personnel who have a favourable impression of the relationship between use and performance are more likely to adopt new technologies and keep using them³⁵. People will make use of IT applications if they believe that doing so will result in the desired performance on a given task. It was postulated that the perceived usefulness of open-source software and other similar technologies is an external factor motivating their adoption and use. One explanation could be that people only make use of these software if they believe doing so will improve their chances of successfully completing the desired job.

Automation of the library's acquisitions, cataloguing, circulation, and serial control systems was highlighted as a means to enhance the effectiveness of the library's housekeeping operations³⁶. This means that when library personnel decides to make use of open-source software for services that have been performed manually or for a new technology-based services, they do so based on the expectation that it will help with cost management, ability to reach more users and the opportunity to do tasks that were previously impossible³⁷.

The use of open-source software has improved information access by making it easier for information users to get their hands on the information they need³⁸. Now, patrons can conduct searches at the library and from home using criteria such as author, title, subject call number, and keyword. As an added bonus, this method guarantees that the machine-readable catalogue may be accessed and displayed in a wide variety of ways that would be impossible with a hand-written catalogue.

2.1.3 Organizational Factors in Tertiary Institution Libraries

The acceptance, use and sustainability of technology, particularly open-source software, in any organisation does not come naturally. It often baffles scholars, that, even within the same industry, some organization are more likely to be open to the use of technology than others. Various factors always come into play to determine whether an organization is ready to commit to the use of open-source software. One of such factors is the organization factor. Organization factors refer to the internal factors within an organization such as top management support, organizational size, the presence of boundary spanners, perceived total cost of ownership, relevance of the proposed software to the organization etc³⁹.

Each organisation has some specific peculiar issues associated with it which guides its operation and informs its attitude or disposition to something such as the adoption of open-source software. Experts in the field of organization psychology have always written about organization culture, organization characteristics and organization personality. All of these provide the metrics for organisation factor as a variable in this study. It is therefore important to discuss organization culture as it underlies various organization factors examined in this study.

The concept of organization culture has a long history in the field of management. Despite the variety of definitions, one author suggests that organization culture is "the pattern of shared basic assumptions invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and integration, that has

worked well enough to be considered valid and therefore to be taught to new members as the correct way to perceive, think, and feel in relation to those problems"⁴⁰. Some authors argue that an organization's culture is the social glue that keeps its members together. The prevailing culture of an organisation can be exhibited in its members' usual dress, speech patterns, preconceptions, symbols of power, and principles⁴¹. That is to say, an organization's culture is the sum total of its character and standards, practises, and shared values, attitudes, beliefs, or perceptions that are passed down from older employees to younger ones, both consciously and unconsciously. In light of the foregoing, it seems plausible to suggest that organization culture might serve as a useful resource for understanding the management of change, such as the introduction of an open-source software in academic libraries, thereby contributing to quality improvement.

The reason why organizational factors can be an issue in the use of OSS can be seen in one of the frameworks used to measure organization culture, i.e.; the Competing Values Framework (CVF). The framework suggests each organization always has to choose between competing values. This in the context of this study can be the decisions to stick with the familiar proprietary software or to buck the trend and choose Open-source Software (OSS). Different value orientations are reflected along two dimensions in the competing values framework (CVF), which is a synthesis of organization theories. The flexibility-control axis is the initial dimension or set of competing values. How much an organisation values change and how much it values stability. It is indicative of a preference for decentralisation and adaptability over command and control.

The internal-external axis represents the second set of competing values. It means that an academic library can choose to be reactive or proactive. The question at hand is whether

library's priorities lie with its own operations or with its surroundings and stakeholders like shareholders, investors, suppliers, partners, and clients. Academic libraries as knowledge oriented institutions are supposed to be visionaries, seeing trends before they emerge and adapting easily to changes in their environment. However, in reality many academic libraries are only reacting to exigencies encountered in their environments. If left alone, many academic libraries would not bother to automate their services. A focus on the organization's internal functioning and growth characterises an internal orientation, whereas a focus on competitiveness, adaptation, and external engagement characterizes an external one.

With these two dimensions in mind, scholars have identified four distinct organization culture stances: flexible, controlled, internal, and external⁴². These include group (team), developmental (adhocracy/entrepreneurial), rational (market), and hierarchical (bureaucratic) cultures. Organizational factors such as size, scope, trust, centralization, technology readiness, formalisation, management complexity, and the calibre of available human resources, as well as technological and managerial preparedness, inventiveness, and top-level support, all contribute to what is known as "organization context". The four cultural perspectives should not be seen as exclusive of one another. As a result, an organisation may display a number of various culture orientations, but one may be very prominent. It therefore means that organization may be innovative, conservative, encourage staff contribution or simply be bureaucratic. This is shown in the metrics that have been used to measure organization factors in this study,

Researchers focusing on the organization factor as a variable in the adoption of technology have focused on many interconnected metrics to describe key organization

factors. These include the structure of the enterprise such as the company size, the number of employees, the communication processes including the level of centralization and formalization. Organizational structure is a key factor in technology adoption and has an impact on the social interaction among the company's employees⁴³. Organization with flatter or decentralized structure use cutting edge technology better than others⁴⁴. This is because they always see the need to coordinate all section of the organisation and wish to bring uniformity in their operations.

One of such example led to the development led a New Zealand library board to develop the Koha software in 1999. The library has many branches in different towns and villages and it was looking for an integrated library system that can bring uniformity into its operation and would not be beyond its budget. Indeed, Koha was envisaged as a simple library software. However, the decentralisation and peculiarities of each branch led to continuous modifications until the software became the robust Library management system used across the world today⁴⁵. This support the assertion of experts that decentralized organisation would try to ensure efficiency by adopting new and more advanced technologies to improve the coordination and communication processes inside the company and outside with their partners⁴⁶. There are also metrics that apply to all form of organisation, whether decentralised or not. One of these metrics is top management support.

Top management support has been identified as a key recurrent factor critical to the adoption of technological innovations such as open-source software⁴⁷. Top management support is the wholesale endorsement of the proposal to implement the use of technology such as open-source software by those who have the power to approve or reject the

proposal. Another group of scholars defined top management support as “managerial beliefs about technological initiatives, participation in those initiatives, and the extent to which top management advocates technological advancement”⁴⁸.

In general, top managers are in charge of guiding the enterprise’s technology leadership and strategy. Top managers typically support initiatives and get involved in making the decision of adopting new technologies⁴⁹. Usually, this variable is evaluated by the level at which senior managers actively spearhead new initiatives and get involved in defining the role new technology will play within the organization⁵⁰. Top management is defined by the willingness and reading of management in adopting the proposed software, the perception among top management that adopting the software is important, and the level of support shown by management for the software adoption.

Support from the management in the process of adopting and innovation is crucial because it ensures a clear vision, dedication, efficient use of resources, a welcoming work environment, help in removing obstacles, and a willingness to adapt to new circumstances. In the context of open-source software use, top management support plays an important role because OSS adoption may involve new regulatory requirements, a high degree of complexity, the acquisition of new resources, the integration of resources, the re-engineering of operational process, interaction with library users information exchanges and the development of new skills and competencies^{51, 52}. This explains why the enthusiasm share by employees about the adoption of new software may not be shared by management. It often happens that employees or middle level manager who introduce new software often overlook the implication on organisation’s process and the changes it will require.

According to a scholar, “few solutions have been prescribed so religiously and ignored as regularly as top management support in the development and implementation of technology⁵³. High levels of top management support for a specific IT innovation ensures the long-term vision, commitment and optimal management of resources, creation of a favourable organization climate, support in overcoming barriers and resistance to change⁵⁴. A study conducted confirmed that organization that had adopted blockchain demonstrated high levels of management support. Furthermore, this study identified that within adopting organization top management support for block chain grew gradually and was influenced by employees who were able to demonstrate real world value of adopting blockchain in terms of creating block chain prototypes which were underpinned by viable business models⁵⁵.

In order to successfully implement open-source software, academic libraries would need buy-in from the top management in order to develop a competitive environment and invest in the necessary resources (technical knowledge and physical infrastructure). With this backing, academic libraries overcome their conservatism and resistant to change. In order to effectively manage any prospective organization change, senior management must be aware of the advantages of embracing open-source software and demonstrate their support for the shift by articulating a clear vision and demonstrating a firm commitment to it. Due to the potential for the open-source software implementation to need the integration of resources, activities, and the reengineering of some processes, the participation of senior managers is crucial. Thus, it is believed that this factor has a major effect on the spread of the adoption and use of open-source software in academic

libraries⁵⁶. Another factor that can affect the use of open-source software in academic libraries is organization readiness

Organizational readiness refers to the ability of an organization to manage and invest in the adoption of open-source software by having the technical IT resources and expertise⁵⁷. Organization readiness is conceptualised as the availability of specific organization resources to adopt new software or replace the existing one. This conceptualisation is frequently categorised under several headings, including human resources, financial, and infrastructure facets⁵⁸. Human resources aspect of organization readiness refer to the presence of employees with the requisite knowledge, skill and experience to manage the new software. Studies have suggested that the low implementation of library software among Nigerian academic libraries is primarily due to lack of ICT skills among library personnel. This submission seems plausible in view of various free and open-source software that can be adapted in library services but which Nigerian libraries are not using.

The outbreak of the COVID-19 pandemic challenged libraries all over the world to increase their technological integration. Before then, Nigerian academic libraries have been unable to expand their services beyond email reference, document delivery, and inter-library borrowing⁵⁹. In that period, academic libraries in other countries were adapting to the demands of remote learning by assisting students in searching for and locating resources for assignments; instructing students on how to use these resources; and supporting students' educational needs. It is also worth noting that libraries contribute to distance learning by hosting digital archives and databases. Frequently, libraries will include listings of electronic resources with active hyperlinks so that patrons can easily

gain access to them. This was not available in Nigerian academic libraries due mainly to lack of technical skills among library personnel.

A systematic and random inspection of the websites of some of the libraries revealed nothing was ongoing to assist the online education of users throughout the lockdown, contrary to what was reported in the literature. As a result of technological advancements, the traditional methods of managing library services that aid in teaching, learning, and research in academic institutions have undergone radical transformation⁶⁰. Libraries today increasingly extend their reach beyond their physical locations. As a result, it is crucial that library personnel in Nigeria give developing their expertise in information and communication technologies the priority it deserves. Library personnel, regardless of the sophistication of the ICT infrastructure deployed in the library, must possess relevant ICT skills in order to make the most of them in meeting the ever-changing information needs of users and making a significant contribution to the emerging change in teaching methodologies. The literature, however, has revealed that many Nigerian library personnel lack the ICT skills necessary to deliver effective library services in support of teaching and learning. The future viability of library personnelhip is in jeopardy unless library personnel rise to the task of developing the adaptable skillsets essential to succeed in today's dynamic workplace. Lack of digital skills among library personnel indication lack of readiness. This is even more so when there is no financial capacity.

Financial facets refer to the allocated financial resources an organisation commits to new IT innovations. While open-source software are free of cost, there is always other cost such as installation cost, hardware, routine maintenance and the cost of acquiring new skilled personnel. While certain research has focused on the financial resources from the

perspective of a specific IT innovation (, in general, many studies have focused on financial resources from the perspective of any new IT innovation. Finally, infrastructure facets refer to existing IT platforms on which new IT innovations can be. When organization readiness for a new IT innovation is high, an organisation's management and staff are more likely to initiate change, exhibit greater effort and persistence, and engage in enhanced cooperative behaviour. Consequently, this results in a more effective adoption of the new IT innovation. While existing theoretical research suggests that organization readiness has a significant influence on the adoption of open-source software such as blockchain software , there is currently a dearth of empirical studies which have confirmed that this is the case⁶¹. A study however confirmed that that the presence of sufficient organization readiness in terms of the availability of financial and employee resources and access to IT infrastructure have a positive influence on an organization decision to adopt open-source software⁵⁵.

Studies conducted in Nigerian academic libraries however suggest a lack of financial and technical resources. Libraries are not immune to the high expenses associated with the introduction of ICTs, just like any other business or organisation. Despite this, it has been established that funding for Nigeria's academic libraries is inadequate. Libraries in Nigeria are underdeveloped due to a lack of funding⁶². To a large extent, university libraries are supported by the government-mandated 10% recurring budgetary allocation of their parent institutions. Not even the most basic expenses could be paid for with this.

It was reported that the average Nigerian university receives an estimated annual income of N3.6 billion (about \$7.2 million) from government allocations and internally generated revenue. However, specific estimates of Nigerian university and library budgets are not

available in the public domain (from school fees and other sources). Ten percent of the projected revenue, or roughly \$720,000, will be donated to the university library⁶³. It was noted, however, that many university libraries do not receive up to 10% of their university budgets because much of the income is spent on other priority areas, such as staff salaries and allowances, administrative operational costs, research, and capital projects like the building of hostels, classroom blocks, and others. In addition, they mentioned how underfunded library finances are always a problem⁶⁴. As a result, most academic libraries invest all of their funds into buying books, maintaining online databases, and subscribing to newspapers and periodicals, leaving nothing for other uses.

Library personnel in Nigeria understand the value of information and communication technologies and appear open to incorporating them into their established practises. By capitalising on the strengths of information and communication technology, library services can better bolster academic pursuits. Due to this realisation, libraries have proposed a number of ICT initiatives; nevertheless, difficulties with technological infrastructure appear to be the principal obstacles to the implementation of such projects. Authorities in Nigeria and other developing nations have not paid enough attention to the technology infrastructure that could help advance development programmes there. As branches of larger organization, libraries often defer to their parent groups for approval on major initiatives. Libraries may seem unable to carry out ICT projects due to the lack of attention such infrastructures receive from parent bodies.

Technology infrastructure is notoriously prone to problems including theft, inadequate power, disinterested workers, and abandonment, as has been repeatedly documented in academic research. Libraries in Nigerian universities and colleges may lack the

resources—hardware and software—necessary to provide continuous support for academic activity. If libraries do not receive adequate funding, they will be unable to upgrade its technology to stay up with the latest developments in an industry that is continuously evolving to fulfil the needs of its consumers. Because of the gross insufficiency of technological infrastructure, initiatives that would have better projected the services of library personnel and led to quality service delivery in support of virtual teaching and learning have been stymied. Furthermore, because of their focus on non-profit work, libraries often receive inadequate funding and assistance for their technology infrastructure from government and corporate entities⁶⁵.

Prior studies indicate that, in addition to organization readiness, organizational size has a positive impact on adopting innovations and new technologies. Despite the general poor funding of libraries in Nigeria, academic libraries attached to large universities such as federal owned and some private universities, usually has sufficient resources to drive innovations. In large libraries, it is usually easier to use economies of scale for new technologies than small ones⁶⁶. Organization size is however not limited to students population, it also affect the range of services offered by the library

Organization size is considered an important predictor of technology adoption⁶⁷. Extant research and industry reports suggest that large libraries are more likely to adopt technology than small ones. Many past studies suggest that an enterprises' willingness to adopt a new innovative IT is positively influenced by organization size. The reasoning behind this is that large organization possess more complex and diverse facilities which positively contribute to adoption.

Micro enterprises and SMEs, for instance are susceptible to many barriers which constrain their ability to adopt IT innovations such as resource poverty (e.g. lack of IS personnel and expertise) and small IT budgets. However, research indicates that in the case of specific IT innovations, because of the characteristics of the technology and the flexibility and adaptability of micro enterprises and SMEs, the opposite has been found. For example, empirical studies have shown that SMEs were more suitable and more inclined to adopt cloud computing technologies⁵⁵. This also has implications for academic libraries as small libraries with limited collection and library space may invest in technology to expand information access and extend their services to users beyond the library and its opening hours. Consequently, further empirical research is necessary to establish a consistent relationship between organization size and technology adoption. The aforementioned organization would be greatly helped by the activities of boundary spanners.

Boundary spanners "individuals who connect their organisation with external information and can bring the organisation into contact with fresh developments⁶⁸. Literaly, boundary spanners are people whose knowledge and activities transcends the boundary of a particular discipline or industry. Boundary spanners are individuals who act as intermediaries between different groups or organizations. They serve as a link between people and organizations that may have different goals, perspectives, or backgrounds, and facilitate communication and collaboration between them. Boundary spanners are often found in organizations that have a high degree of complexity or diversity, and they play a key role in helping to bridge cultural, social, or organizational divides. They may also be responsible for coordinating activities or projects that involve

multiple parties, and for facilitating the exchange of information and resources between them⁶⁹.

Experts have stated that OSS adoption is typically a bottom-up rather than a top-down initiative, and they go on to say that in most of the firms they looked at, there are some employees that are informed on OSS and can promote its introduction. This means that there are certain library personnel and library personnel who are more aware than others, about various open-source software used in other industries that can be useful to academic libraries in general and their own libraries in particular. Boundary spanners can also be personnel who have worked in other institutions and libraries and have acquired experience in the use of various open-source software that are not being used yet in their current establishment.

From another perspective, boundary spanners in the library can be technical staff in the library with information technology experience. Such people keep in touch with technology developments and due to their experience working in academic libraries or with academic library personnel, they can easily identify relevant and useful open-source software. They are often encouraged to support OSS by its technological and commercial advantages. Boundary spanners who promote the use of emerging open-source software in their organization are also referred to as "OSS champions"⁷⁰.

Researchers reported that several businesses and government agencies in Belgium were surveyed to see what factors led them to use open-source server software. The study to test observed that the presence of boundary spanners would be positively correlated with the adoption of open-source server software because such evidence. Findings from their study indicate that the presence of boundary spanners is the single most important factor

in driving adoption. Sometimes, boundary-spanners' selection of OSS is motivated by ideology, as discovered in another qualitative study. Smaller firms are more likely to be swayed by their employees' strong convictions when making adoption decisions⁷¹.

2.1.4 Environmental Factors in Tertiary Institution Libraries

Every organisation operated in a particular environment. Organization like libraries have been likened to a system. This is because the use environmental resources and returns environmental benefits through the products and services they offer. The term 'environment' in the context of an organisation such as academic library is not limited to geographic or a specific location but a whole range of interacting elements capable of influencing the organisation. An academic library's "business environment" consists of any external factors that may have an impact on its operations, whether these factors are direct or indirect. It can also be thought of as the sum total of everything outside of a company's control that have an effect on its business decisions (such as the economy, society, government, law, population trends, technology, etc.).

A scholar also described environment as the total of all things external to organization and industries that affect their organisation and operation. From another perspective, the term "business environment" refers to the "climate" or collection of factors, economic, social, political, or institutional, in which businesses operate. The business or operating environment can also be referred to as the opportunities and dangers to an organisation can come from both internal and external sources. "Environment includes of elements that are mostly if not fully external and outside the control of each industrial company and their managements.

The operating environment, is characterized by entities such as clients/customers, competitors, suppliers, government, and the prevailing social, cultural, political, technological, and legal conditions. These are all examples of forces and influences that make up what is known as the "operating environment," which is the sum total of everything outside of a business that has a significant impact on how that business operates. Academic libraries often come under the influence of some of these elements or forces directly, while others may function more subtly.

Based on the aforementioned criteria, we can deduce that an organisation's operating environment includes both internal and external elements that either represent risks to the company or present chances for profit. Businesses rely on society for a variety of inputs, including labour, money, tools, data, power, and materials. When considering environmental influences, it is important to distinguish between different types of environments. There is an internal environment as well as external environment both of which exert certain forces on the organisation.

These external factors can be either beneficial or detrimental to the organisation. Every organisation makes an effort to respond to the opportunities and challenges presented by the environment. Organization can only respond to the external environment around them because there is nothing they can do to alter it. In order to take advantage of opportunities and counteract dangers from the external environment, organisation must make adjustments to the internal environment. Therefore, it is crucial for a organization to regularly conduct environmental analyses in order to thrive and achieve their set objectives. This is important because the nature of the corporate world is dynamic, which means that it is constantly evolving. It is impossible to foresee how the business climate

will evolve. The precise nature of future events and the dynamics of the economic and social environment are notoriously difficult to foresee. Each local, regional, and national business climate is unique. Therefore, organisation must assess their operating environment in order to develop a viable strategy to succeed.

To scholars in the field of management, each organisation has two forms of environment; internal and external environment. Both of these environments exact some pressure on the organisation. The internal environment also includes students, lecturers, other members of the tertiary institutions and library personnel. The internal environment also include leadership, employee attitude, library users, institutional managements etc. the external environment of library personnel is made up of other libraries, online information sources, regulatory bodies, and the larger society. The emphasis of the environment aspect is on the characteristics of the industry, constraints and opportunities, practices, and legal regulations that may impact the innovation adoption decision process⁷².

To put it simply, the word "external environment" refers to the external forces, factors, and institutions that are not under the direct control of the organisation but yet have an impact on the organisation's operations. To name only a few examples: customers, rivals, suppliers, the government, and societal, political, legal, and technological issues. For academic libraries, their operation are influenced by the dictates of their internal environment, chief of which is the parent institutions. their external environment also includes regulatory bodies, government policies, political environment and global development especially in technology.

Government economic, social, cultural, and tax policies are adhered to, as are regional treaties and worldwide alignment. Because of the ever-changing nature of the business world, companies are inherently dynamic entities. External pressures, such as competitor pressure and customer pressure, may influence decision makers to respond to their surrounding environment, copy industry leaders, and abide by standard organizational practices. Researchers demonstrated that both the internal and external environment are always exert pressures that can influence whether a library considers open-source software and other technology adoption. These pressures are discussed in this study under competitive pressure, normative pressure, and regulators' pressure.

Competitive pressure is the pressure that comes in from the various competitors that places academic libraries in a position to be concerned about being perceived, amongst their peers, as lagging behind their competitors or suffering loss of relevance. For instance, a scholar submits that an organisation is more likely to adopt a technology when it learns that many of its competitors are currently adopting new technologies. It is also possible for an academic library to feel threatened when it learns that many of its competitors will be adopting smart technologies in the near future⁷³. Further in illustrating how the activities of others pressurize academic libraries to adopt technologies, it was reported that the activities of key competitors can also put a library under pressure to adopt open-source software. Most importantly, a library can be pressured when its competitors that adopt technologies are perceived favorably by others in the industry⁷⁴.

The influence of environment can also be negative especially when majority of other actors in the environment are not making any significant progress. For instance, many

academic libraries in Nigeria have indicated that they have not subscribed to scholarly databases due to the absence of consortia. This means that an academic library surrounded by others who are still relying on the manual system may not be encouraged to make efforts in adopting technology. In other instance, academic libraries are also often reluctant to adopt open-source . Libraries can also be discouraged by the failure of others in making attempts to adopt open-source software. However, competitive pressure has been the focus of many studies.

A study reported that technology adoption among SMEs was mainly driven by the ambition to compete and survive in the Industry 4.0 era, as well as pressure from trading partners and customers for digitalization⁷⁵. For the purposes of this research, the term "competitive pressure" refers to the degree to which organization feel threatened by competitors in the same industry or in related but distinct sectors. For academic libraries, the emergence of online information resources has made it necessary that any library seeking to remain relevant must make serious attempt to offer technology-based services. As a result, even libraries with limited funds would seek to adopt some software which would lead them to open-source software

It has been shown that customers and market share declines are the primary indicators of inability of organisation to keep pace with technological advancement⁷⁶. This is also true of academic libraries as many studies have shown low patronage of academic libraries by students and lecturers with many of them preferring online information resources to the resources available in the libraries⁷⁷. The challenge is even more acute in that, even when academic libraries have invested in technology and online resources, the perception still remain that the library is incapable of meeting the information needs of the 21st century

scholar^{78, 79}. ICT is a key enabler of organization' dynamic capacities, which are essential to their survival in today's turbulent, competitive business climate⁸⁰.

As a result, it makes sense to assume that competitive pressure influences open-source software adoption when academic libraries feel that digitalization can improve their competitive position and help them achieve improved performance⁸¹. With the help of open-source software, academic libraries may be able to shift the competitive landscape by reshaping the laws of competition, revamping the structure of information environment, and implementing innovative strategies to get an edge over their rivals; the Internet. According to research conducted by scholars, small and medium-sized enterprises (SMEs) in industries with a high rate of innovation and acute competitive difficulties are more likely to view customizable open-source software as a stronger driver for strategic transformation and enabler of business longevity.

It is the opinion of experts proprietary, generic software cannot provide a competitive edge for businesses, even if they are very small. For academic libraries, the ability to provide innovative services rest the freedom to develop software that reflect the need of a library and its specific set of user. It has been widely speculated that academic libraries will be eager to embrace open-source software, not only for the cost, but also for the freedom it offers to create unique services. This is because of the pressure from other competitors, particular the internet that are offering information various unique services beyond what they average academic library can offer. Another dimension that has been added to the pressure on libraries to adopt open-source software is the regulatory pressure.

Regulatory pressure is the pressure put forth on academic libraries from other organizations in which they are dependent upon. For example, such pressure can come from ministry of education, accrediting bodies and professional bodies. Many Nigerian universities were 'forced' to set up some sort of unified library system (ILS). While some of these libraries were able to achieve their goals with their first attempt, others ran into significant difficulties. Some libraries had trouble because of a lack of resources (both financial and human), a lack of maintenance (of both equipment and infrastructure), a lack of reliable power supply, and a lack of quality control (of both hardware and software)⁸². The majority of libraries tried again with TINLIB, their second try (the information navigator library management software). The National University Commission NUC introduced TINLIB to encourage its usage in libraries, and the NUC generously provided the necessary software to many of those institutions at no cost⁸³.

The use of this software was also plagued with several issues as many libraries found them inadequate and difficult to maintain⁸⁴. Furthermore, the majority of the software's modules are unnecessary to the libraries. The software was similarly difficult to use due to its DOS-based development prior to Windows' release in 1998. For majority of the libraries, maintaining software was a major headache. Since most of the libraries' needs were not being met by the software, they considered developing their own software. As a result, several research libraries began exploring other options. After some time, libraries made attempt to use the Computer Documentation System Integrated Set of Information Systems (CDS/ISIS).

The CDS/ISIS also had issues. One such issue is the UNESCO-reported delay in vendor response to user reports of software-related issues. Due to the problems encountered with

CDS/ISIS and Alice for Windows, most libraries have switched to other library automation and management systems, such as SLAM, implemented in 2004 at the University of Benin and the Federal University of Technology in Akure, and KOHA, implemented in 2002 at Bowen University in Iwo.

In 2011, Redeemer University joined the ranks of the Nnamdi Azikiwe Library at the University of Nigeria in Nsukka. As of 2013, we also had Adeyemi College of Education in Ondo, Nigeria, and Federal University in Oye-Ekiti, Nigeria. Also, in 2008, Babcock University in Ilishan Remo, Ogun State, Nigeria, which had previously used X-Lib, switched to Koha. Many other Nigerian university libraries have also switched to Koha, notably those at Osun State University and the Federal University of Agriculture . As a result, Koha has surpassed all other open-source library management systems in Nigeria's academic libraries⁸⁵. The take-away from this is that when libraries hear negative feedback about a particular software, they are not going to use. However, if they see other libraries making use of a software, they will also be encouraged to use such.

The public's impression and wide acceptance is crucial to the success of any software, open-source or otherwise. The result is often the implementation of the programme. First, the software has to be evaluated on the basis of its perceived merits or defects before it is used. This suggests that user expectations play a positive role in the success of software rollouts. Although there have been studies published on open-source , there is a need for further studies on this topic in regards to Nigeria's academic libraries. Perception is a key role in determining use, although it is rarely studied in published studies. Instead, researchers focus on other aspects of the use and adoption process, such as the motives

for use and adoption, the training process, and the maintenance routines⁸⁶. Another form of environmental pressure is regulatory pressure.

The role that external partners play in shaping how organization decide to adopt new technologies is crucial here. As such, the demand from a library's parent institution can sway their decision to adopt modern information technology. When academic libraries have various branches such as in the faculties and satellite campuses, the use of open-source software make such branches benefit from the and facilitate innovations⁸⁷. Additionally, the parent institution's technology assistance and shared services make it easier for the library to adopt new technologies.

Competition intensity is another crucial environmental component of technology adoption⁸⁸. It has been found in multiple research that the greater the level of competition academic libraries experience, the more likely they are to adopt new information technology. Studies have shown that businesses in highly competitive markets often acquire cutting-edge technologies in an effort to gain an advantage over their rivals and alter the playing field⁸⁹. However, managers feel more peer pressure to adopt new technology when competitiveness levels are high. There appears to be a correlation between the level of competition and the rate at which organization use open-source technology⁹⁰. For organization such as academic libraries that operates in dynamic environments, the normal changes that they expect to go through can also influence the adoption of open-source software. This pressure is called normative pressure.

Normative pressure is the pressure put forth by professional and trade societies to fit industry best practices or standards. It is the pressure to comply with industry standards. One of the most influential factors in determining whether or not a academic libraries

adopt open-source software is the degree to which it is forced to do so by its contemporaries, patrons, and the society at large⁹¹. To put it another way, academic libraries are particularly vulnerable to impositions from online information services and from information users for receiving better services. As a result, the pressure that academic libraries feel from their patrons and society to embrace open-source software for process integration, improved communication, and more efficient data transfer is what is meant by "environmental imposition.

A scholar reported that academic libraries can be induced to use open-source software through recommendation, the promises technical support, and threats access restraints. For example, a study reported that Iranian SMEs operating as first-tier suppliers to multinational automotive sectors were requested to handle all of their communications, transactions, and data exchange through a single integrated enterprise resource planning system (ERP), requiring them to make significant investments in technology⁹². When a value chain shifts toward smart manufacturing, all members of that value chain, including SMEs, are compelled to consider technology adoption and enhance their digitalization competency because the scope of smart manufacturing extends beyond organization boundaries and involves intelligent supply chain and connected (smart) business partners⁹³.

The same can also be seen in academic libraries. When the National University Commission (NUC) introduced the use introduced TINLIB Nigerian academic libraries, it forced them to invest in hardware such as computers and internet routers. In the same vein, with the introduction of donated databases such as Research4life, JSTOR, e-Granary and Teal, many libraries in Nigeria started investing technology in order to take

advantage of these resources. Also the preference for electronic information resources and remote services among library users has dictated that academic library offer technology based services which can be done through the use open-source software.

Another source of normative pressure is the professional associations. In Nigeria, the N

2.2 Theoretical Framework

This study is based on two theories namely the Stimulus Theoretical Framework and the Technology, Organization, and Environmental Framework (TOE). The Stimulus Theoretical Framework is used to measure the dependent variable which is motivation to use open-source software while the Technology, Organization, and Environmental Framework (TOE) is used to measure the independent variables; organization factors and environmental factors.

2.2.1 Stimulus Theoretical Framework

The Stimulus Theoretical Framework was developed by PC Lai in 2017⁹⁴. Holistically, the framework posits that the design and security of a technology are the stimulus that represent the system and the features capabilities while, the perceived ease of use and perceived usefulness are the organism that represents the motivation to use the system which leads to consumers' response to use the system. The framework was developed after a critical review of existing models and theories of technology adoption such as the Theory of Diffusion of Innovations (DIT) (Rogers, 1995), the Theory of Reasonable Action (TRA) (Fishbein and Ajzen, 1975), Theory of Planned Behavior (TPB) (Ajzen, 1985, 1991), Decomposed Theory of Planned Behaviour, (Taylor and Todd, 1995), the

Technology Acceptance Model (TAM) (Davis, Bagozzi and Warshaw, 1989, Technology Acceptance Model 2 (TAM2) Venkatesh and Davis (2000) and Technology Acceptance Model 3 (TAM3).

The Stimulus Theoretical Framework (figure 2.1) provides the structure for the dependent variable of this study which is motivation to use open-source software. The TAM has already validated the predicting power of ease of use and perceived usefulness in the acceptance and use of new technology by various categories of users. The stimulus framework suggests that both factors can now be seen as motivators for the use of technology. In the context of this study, the ease that the use of open-source software brings into the performance of library routines is expected to motivate library personnel to make use of available open-source softwares. On the other hand, when library personnel have a perception that open-source software is difficult to use or that it will make their task more complex, they will not be motivated to make use of open-source software.

However, similar to perceived ease of use is the perceived usefulness; when library personnel are introduced to open-source software or when libraries adopt open-source software, it is the perception of its usefulness that will motivate them to use the software. In a situation where an introduced software is not useful for any library routine, such software will not be used. Some also believe that library personnel may overlook perceived ease of use when they perceived a new software as very useful in their work. This means that perceived usefulness may be a stronger motivator to use open-source software than perceived ease of use.

The Stimulus Theoretical Framework has not been used widely in empirical studies because it is recently introduced. In addition, the author has not conducted an empirical validation of the framework. Nevertheless, the framework is innovative and seems promising as technology adoption model.

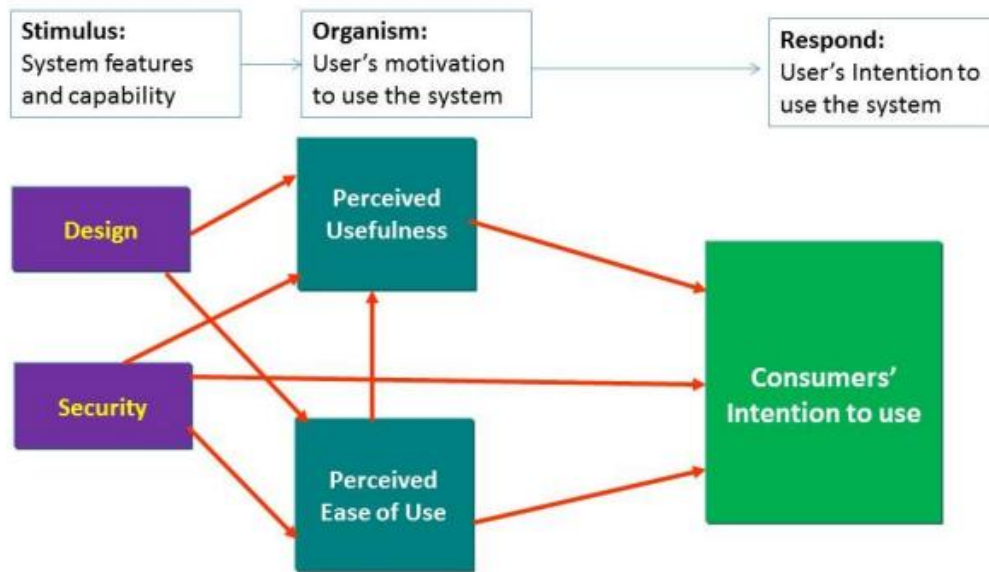


Figure 2.1: Stimulus Theoretical Framework (Design and Security Stimulus Research Theoretical Hypothesis) (Lai, 2016).

2.2.2 Technological, Organizational, and Environmental Framework (TOE)

The Technology, organisation, and environmental (TOE) framework is another firm-level technology adoption theory. It was introduced by Tornatzky and Fleischer in 1982⁹⁵. The Technology-Organization-Environment (TOE) framework is a model that is used to analyze the interactions between technology, organizations, and their external environment. The TOE framework helps to understand how these three factors influence each other and how they can be managed to achieve specific goals. The TOE framework proposes three main facets to explore the factors that affect the organization's acceptance

of innovation technology. These are; technological factor, organization factor and environmental factor.

Technological factor refers to the tools, systems, and processes that are used to create and deliver products or services. Technology can include hardware, software, and other types of infrastructure. The technological factor includes the characteristics and the usefulness of the innovative technology. It is important to consider the technological context, when deciding whether or not to accept a technological breakthrough. Internal and external technologies, as well as current and future technologies, make up what is called the "technological context" of an organisation. In this technological setting, the framework focused on the ways in which specific technologies may affect the adoption decision. Features such as perceived benefits or relative advantages; perceived barriers; compatibility; the perceived importance of compatibility; complexity; (f) trialability are all included as part of technological factors.

Organizational factors refer to issues that are peculiar to a particular organization. These are issues, mostly in the control of the organisation capable of predicting whether it will be disposed to the use of open-source software or not. The framework has identified some factors such as the size of an organization, technology readiness, the presence of boundary spanners as well as level of support for OSS adoption from top managers. The organization component of the TOE framework also includes factors such as leadership, management, and communication. Other factors that have been found relevant by scholars also include the internal issues within the organisation such as management, employee, products and services. The organization aspect places premium on the

fundamentals of the business, such as its size, number of personnel, communication systems, and degree of centralization and formalisation.

The organization structure of an organisation is an important determinant of how its personnel interact with one another and with new forms of technology. Companies with a flatter or more decentralised structure are more likely to make advantage of cutting-edge technology. These businesses are improving internal and external collaboration and communication by implementing cutting-edge technologies.

Environmental factors refer to the external environment in which the organization operates. The environment imposes three main pressures on organization such as normative pressure, competitive pressure and regulatory pressure. The environmental context involves the issues exist in the business related field, such as the competitors and business partners. When considering the environment, it's important to consider factors like the nature of the industry, the availability of resources, the norms and rules that govern it, and any other factors that can influence a company's decision to adopt a new form of innovation. Decision-makers may be influenced by external pressures such as those from competitors and customers to adapt to their surroundings, mimic the actions of market leaders, and follow established procedures. It has been shown by researchers that external forces affect the possibility of facilitating the growth of technological adoption.

The TOE framework can be used to analyze a variety of issues, including the adoption and implementation of new technologies, the management of organizational change, and the alignment of technology and business strategy. By understanding the interactions between these three components, organizations can better understand how to leverage

technology to achieve their goals and navigate the challenges of their external environment.

There are a few criticisms of the Technology-Organization-Environment (TOE) framework that have been raised by researchers. One of such criticisms is that it places too much focus on technology. Some critics argue that the TOE framework places too much emphasis on technology and not enough on other factors, such as organizational culture, strategy, and leadership.

The framework was also accused of paying little attention to power dynamics in organization. Some observed that the TOE framework does not explicitly consider power dynamics within organizations and how they may influence the adoption and use of technology. Another related criticism is the perceived limited consideration of organization context. The TOE framework is accused of not taking into account the specific contexts in which organizations operate, such as industry, size, and location. This can make it difficult to apply the framework to a wide range of organizations.

Despite these criticisms, the TOE framework remains a widely used and influential model for understanding the interactions between technology, organizations, and their external environment.

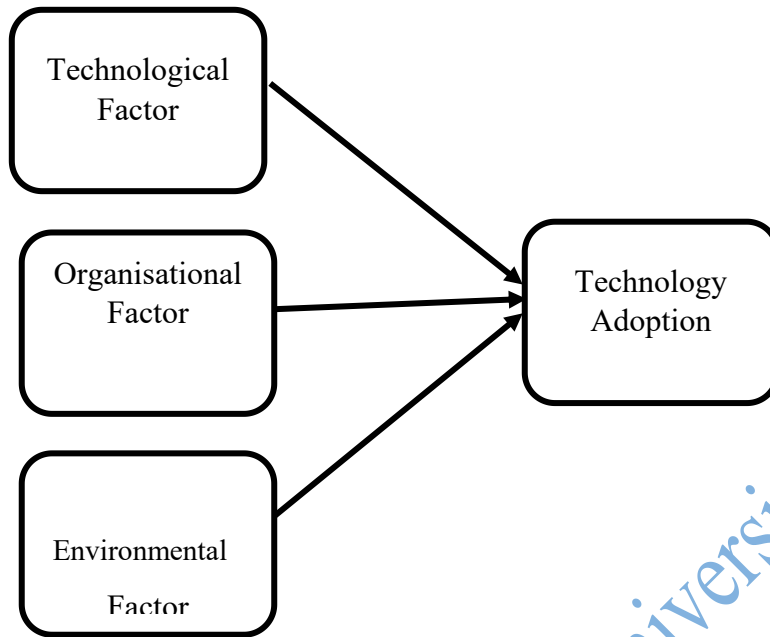


Figure 2.2: The Technological, Organization, and Environmental (TOE) Framework (Source, Abed, 2020)

2.3. Review of Empirical Studies

This section examines various empirical studies related to the focus of this research/

2.3.1 Organization Factors and Motivation to Use Open-Source Software

The use of open-source software is expected to be widespread in academic libraries of developing countries such as Nigeria. However, the reality is that there are still many academic libraries that are not taking full advantage of the available open-source software. This can be understood in light of studies that have been conducted in Nigeria and other parts of the world. These studies have shown that various organization factors can come to play in the motivation among libraries and library personnel to make use of open-source software.

The role of organization factors was highlighted in a study that examined the factors determining the adoption of cloud computing in Saudi Arabia. The study was hinged on a modified version of the Technological, Organizational, Environmental (TOE) framework. The study sample included Saudi university hospitals in Riyadh city. The data were collected using semi-structured interviews and a questionnaire. The study found that certain organization factors such as top management support are important in the adoption of cloud computing in the hospitals investigated⁹⁶. The study emphasized the fact that no matter how desirable the software is to the promoters; it may not be adopted without the support of the real decision makers in the library

Another scholar studied the effect of TOE determinants on e-maintenance technology readiness in manufacturing firms. The study adopted a survey research method. Data was collected from 308 managers from different manufacturing companies, the researcher measured organization factors with metrics such as technology readiness and organization size. The study found that, among other variables, organization factors are significant as predictors of the willingness to adopt e-maintenance technology by the manufacturing companies sampled in the study⁹⁷. This shows that the size of the organisation can affect the interest in the adoption of technology which also suggests that small libraries or academic libraries with inadequate human resources may not be able to adopt open-source software.

Research also examined the factors determining the adoption of big data analysis software by small and medium scale enterprises in Iran. The study adopted a survey research method and the researchers used a previously validated survey for data collection.. The study's sampling frame is comprised of the Iranian Small Industries and

Industrial Parks Organizations, which lists a total of 10,931 SMEs in Tehran, Iran's manufacturing sector. The data collected was analysed using partial least squares (PLS). In the initial part of the analysis, the validity and dependability of the variables were evaluated, followed by structural model analysis. The analyses revealed that organization factors (top management support and organization preparation) have significant effect on SME BDA adoption.

The study especially pointed that SME adoption of various types of technology, such as ICT, cloud computing, e-commerce, CRM, and ERP, is commonly found to be dependent on the assistance of top management figures. Top executives stimulate organization change by conveying and encouraging values through a clearly articulated vision for the company. The considerable relationship between organization readiness and BDA adoption is consistent with findings from previous research on SME technology uptake⁹⁸.

In a related study, researchers also explored the factors determining the adoption of artificial intelligence in telecom industry in China. Bringing together the technology, organisation, and environment (TOE) framework and the diffusion of innovation (DOI) theory, the researchers presented a methodology to investigate the effects of success variables on AI adoption in the telecom business. This framework is made up of specific elements, such as those related to the external environment, organization capacities, and the innovative qualities of AI. An approach known as structural equation modelling is used to examine the information. The results of the study showed that managerial support made it easy for the organization in AI adoption among the respondent. ($\beta = -0.028$, $p > 0.1$)⁹⁹.

In Nigeria, a group of library personnel reported on the implementation of a library management software at the Nigerian Defense Academy. The authors identified the organization factors that contributed to the success of the project. It was shown that the project had top management support. Due of the enormous book stockpiles, the Library's administration outsourced the automation task to the software vendor when they made their initial software purchase. The library's savvy IT team worked alongside the Academy's ICT Unit to complete the retroactive conversion of manual records. This led to the rapid completion of the project. The institutional readiness also contributed as it was reported that, after a readiness assessment, all the necessary hardware and other equipment were acquired. Because of the unreliable nature of the power grid, inverters were also procured and installed¹⁰⁰.

The smooth completion of the projects reported in the aforementioned study is due to organization factors as not many libraries in Nigeria have that kind of support for the implementation of library software. A study on the progress of retrospective conversion of bibliographic records by Nigerian libraries who have installed the KOHA library management system revealed that 70% of them are still in the process even after more than five years. This is mainly due to the reluctance of the management to commit enough resources to these projects. Indeed the study reported that some of the libraries have abandoned the project altogether¹⁰¹.

Another organization factor that can affect the motivation to use open-source software by library personnel is organization readiness. This was explored in a study which examined the readiness of libraries for digital reference services in Ibadan metropolis. The study adopted descriptive survey research design. The study sample was made up of 45 library

personnel from 15 selected libraries in Ibadan. A self-developed questionnaire was employed for the purpose of data collection. Empirical data collected were analyzed using simple frequency distribution and percentage on Statistical Package for the Social Sciences (SPSS). The researchers found that while many libraries in Ibadan were receptive to the concept of digital reference services, many are yet to render these services due to issues such as a lack of trained staff and insufficient resources. This translates to lack of organization readiness which explains the lack of motivation among the staff to look for open-source software they can use for digital reference services¹⁰².

Similarly, a researcher from Nigeria assessed the current level of automation in public libraries across South West Nigeria. The research strategy was a mixed-methods strategy centred on a survey study format. The population of the study included patrons and library personnel at three public libraries in South West Nigeria. Triangulated data was gathered from surveys given to library users and professionals/paraprofessionals through focus groups. The study found that public library automation in South West Nigeria is minimal and in varied levels of development. Moreover, the results showed that there are a number of obstacles that prevent libraries from making full use of ICTs which include lack of support from upper management, a general fear of technology, power outages, lack of proper information and communication technology (ICT) infrastructure, lack of technical skills among others¹⁰³.

In a related study, researchers examined the most influential factors in library cloud computing adoption at selected universities in India. The study made use of social survey research method. The study sample included 510 students drawn from 26 public, private, and state universities across India. Exploratory factor analysis (EFA), confirmatory factor

analysis (CFA), and structural equation modelling (SEM) were also used in the study to determine the strength of the connections between the study's selection of explanatory variables and the use of cloud computing by libraries. The study found that technological readiness is a significant factor motivating the students to make use of library cloud computing services in India¹⁰⁴. Additionally, the results show that the study of people's motives for adopting library services in the cloud has led to original discoveries that are highly useful to the library's users and other stakeholders.

2.3.2 Environmental Factors and Motivation to Use Open-source Software

In as much as organization factors affect the motivation of academic libraries to adopt and use open-source software, it must also be recognized that environmental factors also play certain roles. This seems logical in the sense that academic libraries are systems which interact with their environments. They affect the environment and the environment in turn affect them. Academic libraries have both internal and external environments which influence their operations and philosophy. These influences are often portrayed as pressures because organization would rather continue with a working strategy or practice unless the internal or external environment demands for a change. In line with this scholars have always examined various types of environmental pressures such as normative pressure, competitive (mimetic) pressure, and regulatory (coercive) pressure. All of these pressures can influence the motivation to use open-source software.

A group of researchers from Iraq created a research tool to examine the interplay between coercive, normative, and competitive pressure and their impact on the decision to acquire and technology among business firms. The study sample consisted of 99 small and medium enterprises managers from Thi-Qar province. A structured questionnaire was

used to collect data. Partial Least Squares (PLS) was used to analyse the empirical data collected. The study found that normative pressure has the greatest impact on companies' decision to implement green technologies. One of the most influential factors in people's propensity to use technology practices over time is the presence of coercive forces exerted by regulatory bodies¹⁰⁵. This finding is relevant to academic libraries where normative pressure from the evolution of information services and regulatory pressure are significant to the adoption of technology.

In a related study conducted in China, researchers also examined the environmental factors affecting the adoption of environmental friendly industrial internet of things by businesses. Data were collected using a standardised questionnaire to evaluate the study model proposed. The research results point showed that coercive (regulatory) pressure, normative pressure, and mimetic (competitive) pressure are all significant factors determining the adoption of environmental friendly industrial internet of things by businesses in China¹⁰⁶. The study suggested that organizations such as academic libraries can benefit from a deeper understanding of the environmental pressures they face and adapt accordingly.

Another study conducted in Malaysia focused on the adoption enterprise architecture by public sector organization in Malaysia. Using data from 255 public sector key informants and partial least squares structural equation modelling, the conceptual model was verified. The study found that coercive pressure, mimetic pressure, and normative pressure are prominent among the factors determining the adoption of enterprise architecture among the public sector organisation in Malaysia. This model helps decision-makers in the Malaysian public sector zero in on the most important aspects of the organization and

environmental factors that affect the uptake of enterprise architecture¹⁰⁷. Thus, the results may provide greater insights for enterprise architecture initiators in their enterprise architecture implementation plan and strategic planning.

Researchers also analyzed the correlation between information system (IS) adoption success and the three types of institutional forces (coercive, mimetic, and normative) that drive IS adoption by businesses in Australia. Both the project management strategy and the competence of the project team, two resource-related success predictors, mediated this link. The researchers adopted a purposive sampling technique to select business managers and project managers involved in the adoption of IS in Australia. Structural equation modelling was used for the statistical analysis (SEM). It was discovered coercive pressure had a significant effect on the management of the implementation process. It was also found that mimetic pressure improves project team competency¹⁰⁸. This suggests that with the right policy and oversight, the open-source software will be managed in a sustainable way in academic libraries. In addition, with competition and collaboration other libraries can improve the competencies of academic library personnel in the use of open-source software.

Nigerian academic libraries are also not immune from environmental pressure as studies suggested. A group of researchers evaluated the impact of regulatory pressure in the form of periodic accreditation on the growth of academic libraries in Nigeria. The study used a descriptive survey design. Using a technique of total enumeration, 125 respondents were selected as the sample population. A questionnaire was utilised to collect data, which was then analysed using a basic percentage. The result of data analysis showed that a lack of academic libraries have benefited from the certification process in terms of increased

information resources and a investment in technology. Also identified were some of the obstacles academic libraries in Nigeria face. When there is no accreditation, the library receives inadequate attention and funding from university administration, resulting in subpar library services and no acquisitions¹⁰⁹. Of interest to this study is that the preparation of accreditation often motivates libraries to acquire open-source software in order to meet the criteria set by the National University Commission. The finding of this study was also corroborated by a subsequent study.

Another study by Nigerian researchers looked at NUC accreditation as a method of evaluating and improving Nigerian libraries to make sure the process is effective. The researchers in this study employed a descriptive survey approach and a total enumeration sampling strategy to choose a representative sample of 41 department heads from federal university libraries in South-East Nigerian universities. This study used a questionnaire with a 4-point scale to collect data, which was then evaluated using a mean score. The results of the study demonstrated that libraries benefited greatly from the accrediting exercise by increasing their acquisition of library information resources, internet and online database subscriptions, number of competent employees, and library equipment. The data also showed that without accreditation, libraries are not given sufficient financial support, which in turn leads to a lack of library services, materials, and furnishings, as well as poor upkeep of existing equipment.

According to the findings, Nigerian universities should make the NUC certification process an ongoing one, and a threshold of mandating the release of 10% of the entire budget for institutional recurrent expenditures should be established. As a result of their

findings, the researchers advocated for routine certification as a means to continuously push libraries forward¹¹⁰.

Academic libraries in Nigeria may not be under any competitive pressure from their counterparts as shown in studied focused on the adoption of OSS. This is shown in a study of academic libraries in Imo State. A total of 82 library personnel from the state's six universities participated in the survey. As a result, 82 surveys were sent out, and 63, or 78%, were completed and returned. The data was analysed using descriptive statistics. It was found that only one of the six academic libraries in the survey is employing open-source software in form of Dspace and wordpress, while the others have not yet implemented a digital management system. A number of factors were found to be impeding the delivery and utilisation of information resources and services, including a lack of technological knowledge for its adoption (58.92%), a passive attitude towards the use of technology by management (53.84%), a lack of Internet facilities to download and use software (50.79%), and so on¹¹¹. The implication is that majority of the library may not see any need to adopt open-source since they are not alone in doing this.

However, normative pressure may affect library personnel in Nigerian academic libraries when it comes to OSS adoption. Researchers in Kwara State, Nigeria, surveyed academic library personnel to learn how they feel about open-source library systems. Fifty-eight library personnel from five different academic libraries made up the study's sample. The study used a descriptive survey methodology, with a questionnaire serving as the data collection tool. The results demonstrate that most respondents thought open-source library systems were useful for managing academic libraries' services; the practical usability and efficiency of the open-source systems are what make them effective in the

eyes of library personnel. While the position/designation, amount of education, years of experience, and gender of a library personnel all play a role in how they feel about OSS, the most prevalent difficulties encountered by libraries and library personnel while implementing OSS are a lack of consistent power, money, and resources¹¹². This means that the positive perception of OSS among their peers may influence library personnel to make use of open-source software.

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2.4 Conceptual Model

Conceptual Model

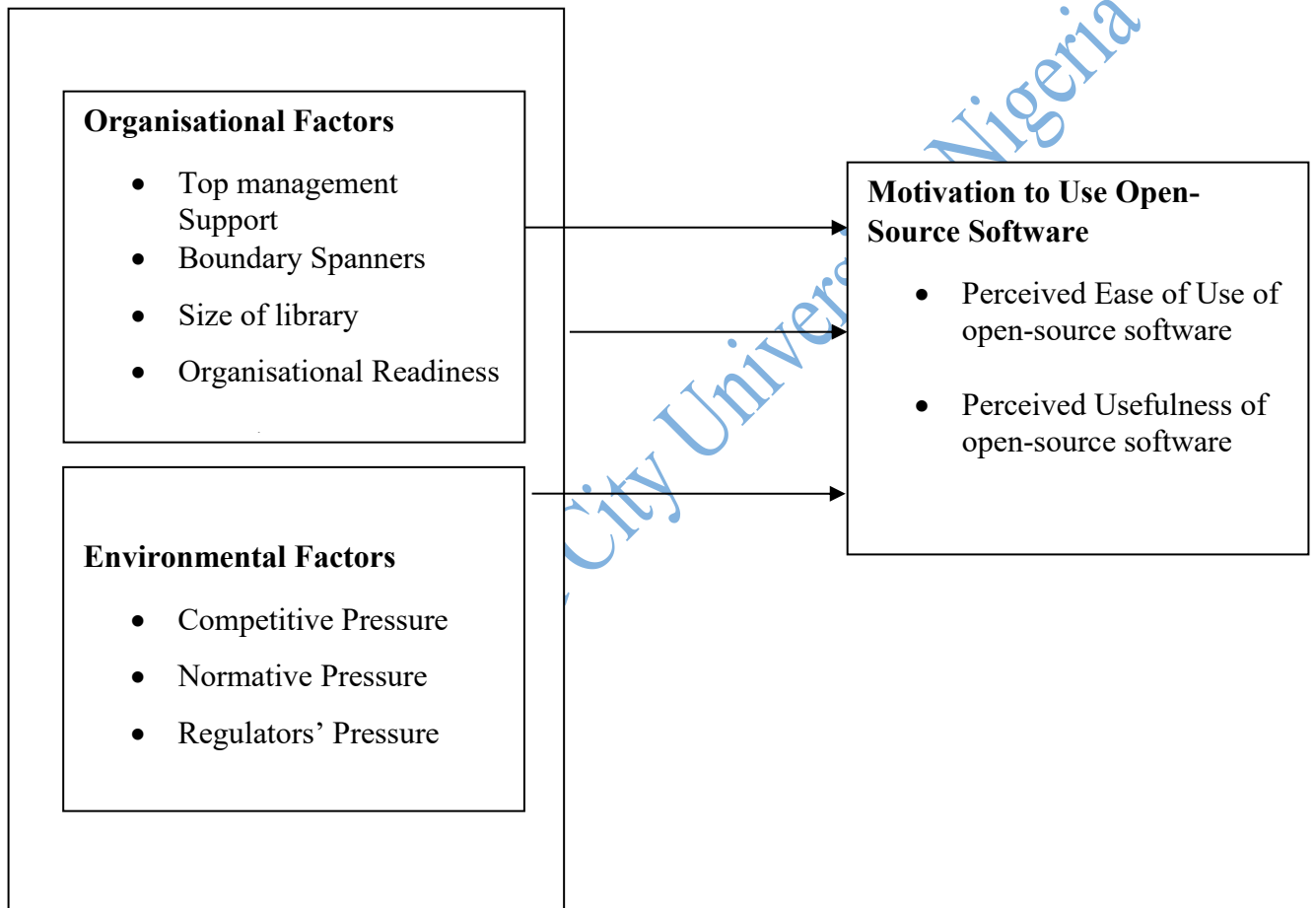


Figure 2.3 Conceptual frame of the influence of organization and environment factors on the motivation to use open-source software by library personnel. (Source, Researcher)

The conceptual framework provides a graphical illustration of the focus of this study. It outlines the exact problem the study is aiming to solve. From the framework, it can be seen that the dependent variable is motivation to use open-source software. This variable

is measured by the metrics provided by the Stimulus Theoretical Framework developed by PC Lai in 2017⁹⁴. The metrics are perceived ease of use of open-source software and perceived usefulness of open-source software. Both metrics are validated predictors of the use of technology so when they are present, there is a very good chance of using a particular technology; in this case, open-source software. However, whether library personnel will find open-source software useful and easy to use depends on certain factors. In the context of this study, the independent variables are organization factor and environmental factors

Both organization factor and environmental were drawn from a popular theory on the use of various technology⁹⁵. Organization factors refers to all the things within and outside the organisation which has an impact on its operation and affects its ability to achieve its set goals. Organization factors include the kind of support provided by top managers in the organisation, the level of readiness of the organisation, boundary spanners and relevance to the library. The variable holds that even when library personnel perceive open-source software useful and easy to use, when the top management does not support the implementation, it may not work out as expected. In addition, the role of boundary spanners who are library personnel with multi-skill and wide knowledge in library personnelhip and technology is also important to keep the library informed about latest development in open-source software. While organization factors are internal to the organisation, there are also environmental factors which covers both internal and external environment of the organisation.

Environmental factors in this study is measured by three main pressure that the internal and external environments put on academic library which may determine their adoption

of open-source software. In this study, the metrics for environmental factors include competitive pressure, normative pressure, and regulatory pressure. The premise of the variable is that the activities and threats posed by competing information services providers such as the internet can force libraries into adopting open-source software. In the same, the constant development and evolution of information services, the common and emerging practice among Nigerian academic libraries etc., can also force libraries to adopt technology. Normative pressure therefore is all about conforming to the prevailing practice among libraries in Nigeria which other libraries can aim to attain or maintain. In addition to the normative is the regulatory pressure.

Regulatory pressure comes from sources such as accreditation bodies, government regulations and policies, professional association etc. Academic libraries are subject to the rule of bodies such as the National University Commission, Library personnel Registration Council of Nigeria and others often mandate academic libraries to put certain resources and facilities in place. Failure to this often result in one form of sanction or the other. Where this pressure is high, and when it relates to the use of technology, it can force libraries to adopt open-source software to meet various needs.

2.5 Summary of Gaps in Literature Reviewed

The review of literature has shown that academic libraries all over the world and in Nigeria in particular, are at the forefront of technology adoption. The constant evolution of publishing practices, information formats and means of information services provision

have dictated that academic libraries continue to apply technologies in their services. technology has also made a lot of new services possible for academic libraries which enables them to meet the needs of different categories of information users. Over the years libraries have relied to proprietary software.

Proprietary software are offered at a fee and the control of the software always remain with the developer or its agents. Many libraries in Nigeria had tried proprietary software and found it useful while others have faced numerous challenges which has forced them to abandon their ambition to render technology-driven services. In addition, the economic downturn in Nigeria which started in the 1980s made it impossible for many library to afford the cost of maintaining proprietary software. This made the appearance of open-source software to be some relief to libraries in Nigeria and other countries in the developed world.

The open-source software offer a lot of advantages to library users as it is free to use, customizable and enable library personnel to acquire basic programing skills needed to manage the software. This has led many Nigerian libraries to adopt various open-source software used for various activities in the library. Some of the open-source software in use in Nigerian libraries include Koha, Dspace, E-print, greenstone, fedoral, joomla, drupal, and others. The software are used for activities such as charging and discharging of information resources, registration of users, electronic information resources management, digital reference services, marketing of library and information services etc. However, not all Nigerian libraries are using open-source software or any software at all.

The level of adoption of open-source software among Nigerian academic libraries is low. Various studies have shown that, despite the various open-source software and the

obvious need for them in library services, many Nigerian academic libraries are still using the traditional method and finding it difficult to integrate open-source software in their work. This has become an issue which has affected the level of patronage of academic libraries in Nigeria. As a result, studies are being conducted on why, despite the availability of these software, academic libraries are still unable to take advantage.

The available literature has made a lot of discoveries. It has been shown that the motivation to use open-source software is often affected by various factors the most common of which is the perceived ease of use and perceived usefulness of the software. For those who have positive perception of ease of use and usefulness, other factors are also affecting the use of open-source software. These factors include organization and environmental factors. Research focusing on the role of organization factors on the use of open-source software in academic libraries are rare but the variables have been applied to other areas such as business, government agencies, small and medium scale enterprises etc. These studies have shown that organization and environmental factors are valid predictor of open-source software adoption.

There is also support for the influence of organization and environmental factors on the use of open-source software in library as various studies have identified the challenges affecting low level of automation in Nigerian academic libraries to include; lack of support from the management, poor attitude toward technology among library personnel, absence of consortia, lack of necessary infrastructure and lack of a definite policy on the use of technology in academic libraries among others. All of these can be grouped into organization and environmental factors. This study is therefore a significant contribution

as it applies the TOE framework to study the motivation to use open-source software by Nigerian academic libraries.

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Chapter Three

Methodology

The chapter will explain all aspects of the research methodology such as search design, the population of the study, sample size and sampling technique, description of the research instrument, data collection procedure, and method of data analysis.

3.1 Research Design

Descriptive survey design will be adopted for this study. This method is considered adequate to provide an in-depth understanding to the perceived reality of the phenomena, thereby providing a descriptive and explorative research using an inductive approach to give depth and understanding to the phenomena being studied without interfering with the variables.

3.2 Population of the Study

The population of the study consists of 198 library personnel from all Universities in Lagos state. This number includes both professionals and para-professionals in those university libraries. Both the professionals and para-professionals are included in the study because the use of technology has permeated every aspect of library personnelships and both categories of staff are involved in the use of technology in the library. The universities included in this study and population of library personnel from each institution is captured in table 3.1

Table 3.1 Breakdown of Study Population

S/N	Institutions	Population	
		Professionals	Para-professionals
1.	University of Lagos (UNILAG), Akoka	18	34
2.	Lagos State University (LASU), Ojo	26	33
3.	Lagos State University of Science and Technology (LASUSTECH), Ikorodu, Lagos	11	12
4.	Lagos State University of Education (LASUED) Ijanikin, Lagos	13	21
5.	Augustine University, Epe, Lagos	3	1
6.	Caleb University, Imota, Lagos	4	3
7.	Pan -African University, Lagos, Lekki, Lagos	3	2
8.	Anchor University, Ayobo Lagos State	2	2
9.	Eko University of Medical and Health Science Ijanikin, lagos	4	3
10	Trinity University, Yaba, Lagos	1	2
	Total	85	113
	Grand Total	(85+ 112)	198

Source: University Library personnel offices 2023

3.3 Sample Size and Sampling Techniques

In view of the number of the study population, total enumeration was adopted to select the sample meaning that all one hundred and ninety-eight (198) library personnel employed in university library personnel across Lagos State were included in this study.

3.4 Description of Research Instrument

The main instrument for the study was a structured questionnaire which was adopted from existing studies. In line with the research Objectives, the questionnaire was grouped into four sections (A-D). The questionnaire is titled “ Questionnaire on organizational and environmental factors on motivation to use open-source software’s among library personnel from academic libraries in Lagos State, Nigeria (OEFMOSSLAL)”

Section A deals with the demographic information of the respondents. It will contain items such as Age, gender, department, academic level, years of experience etc

Section B focused on the level of use of open-source software among library personnel personnel. The section contains items adapted from the literature. It is divided into frequency and purpose of use. All of the statements are measured by a 4-gest Likert scale such as Never, 2-Rarely, 3-One and 4 Always

Section C focused on the organizational factors relating to the use of open-source software in libraries. The section is divided into management support, organizational readiness, and library size. It contains items adapted from a related study based on the TOE framework! All of the statements are measured by a 4-point Likert scale such as 1 Strongly Disagree: 2-Disagree, 3 Agree and 4 Strongly Agree

Section D was on environmental factors relating to the use of open-source software in libraries. All of the statements are measured by a 4-point Likert scale such as 1-Strongly Disagree, 2-Disagree, 3-Agree and, 4 Singly Agree

3.5 Validity of Research Instrument

The research instrument for this study will be submitted to the supervisor for assessment of face and content validity. The questionnaire will also be shown to other professionals in the field. The corrections made after this will ensure the validity of the instrument

3.6 Reliability of the Research Instrument

In order to ensure the reliability of the study instrument, 30 copies of the questionnaire were administered on library personnel from Lead City University, Ibadan and Ajayi Crowther, Oyo who are not part of the study. The returned questionnaire was analysed and the Cronbach alpha value were measured to see if it meets the acceptable standard. The results shows that the Motivation to Use of open-source software scale has a Cronbach alpha value of 0.88, the organisational factors scale has a value of 0.76 while the environmental factors scale has a value of 0.74.

3.7 Method of Data Collection

A letter of introduction was obtained from the Department of Information Management. Lead City University which was presented to the selected libraries. After due permissions have been obtained, the research instrument was administered physically to the respondents by the researchers with the assistance of four trained research assistants. The

research assistants were trained for 3 days because as library personnel they are already familiar with the routine. The whole process of questionnaire administration lasted for two weeks.

3.8 Method of Data Analysis

The data collected in the process of this study was analysed using descriptive statistics such as simple percentages, mean, and standard deviations to analyze the research questions and demographic data. In addition, the study hypotheses were tested at a 0.05 level of significance using inferential statistics. Research hypotheses one and two were analysed using simple regression. The third hypothesis was analysed using multiple regression analysis. The IBM SPSS software was used to analyse the data.

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Endnotes

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Chapter Four

Results and Discussion of Findings

This chapter presents the results of the data collected and analysed to achieve the objectives of the study. In all, one hundred and ninety-eight (198) copies of the questionnaire were administered. However, one hundred and ninety-four (194) were properly filled and returned. Only these were included in the analysis. This means that the return rate is about 98% which is considered adequate for generalization.

4.1 Demographic Data Analysis.

Table 4.1: Demographic Distribution of Respondents

		Frequency	Percent
Gender	Male	99	51.0
	Female	95	49.0
	Total	194	100.0
Educational Qualification	ND/HND	78	40
	BSC/BIS	39	20
	MLIS	49	25
	Mphil	19	10
	PhD	10	5
	Total	194	100.0
Age Range	20 – 25yrs	59	30.4
	26 – 30yrs	41	21.1
	31 – 35yrs	23	11.9
	36 – 40yrs	28	14.4
	41-45yrs	25	12.9
	46 and above	18	9.3

	Total	194	100.0
Years of Experience	0 – 5 years	39	20
	6 – 10 years	49	25
	11 – 15 years	29	15
	16 – 20 years	29	15
	21 – 25 years	19	10
	26 and above	29	15
	Total	194	100.0

Source: Field Survey, 2023

Table 4.1 presents the demographic distribution of the respondents, providing insights into the gender, educational qualifications, age range, and years of experience. Genderwise, the table indicates a relatively balanced gender distribution among the respondents. Out of the total sample, 51% are male, while 49% are female. This gender balance is positive as it ensures a diverse representation of perspectives and experiences within the study sample.

In terms of educational qualifications, the majority of respondents hold an ND/HND qualification, accounting for 40% of the sample. Following closely, 25% have an MLIS (Master of Library and Information Science) degree, while 20% hold a BSc/BLIS (Bachelor of Science in Library and Information Science) degree. Additionally, 10% of the participants possess an M.Phil, and 5% hold a Ph.D. qualification. This diverse educational background is essential for understanding the views and insights of individuals with varying levels of academic and professional experience in the field of library services.

The age range of the respondents is distributed across various groups. The largest group falls in the 20–25 years category, representing 30.4% of the sample. Subsequently, 21.1%

of the participants are aged 26–30 years, and 11.9% are in the 31–35 years category. The remaining age groups, namely 36–40 years, 41–45 years, and 46 and above, represent 14.4%, 12.9%, and 9.3% of the sample, respectively. This age diversity reflects a wide range of perspectives and experiences, which is valuable for examining library services through different generational lenses.

The respondents' years of experience within the field of library services are evenly distributed across various categories. A significant proportion, 25%, falls within the 6–10 years category, while 20% have 0–5 years of experience. Additionally, 15% of participants each have 11–15 years, 16–20 years, and 26 and above years of experience, with 10% having 21–25 years of experience. This distribution allows for a comprehensive analysis of library services from the vantage point of individuals with different levels of professional experience.

The balanced representation of gender, diverse educational backgrounds, age groups, and varying years of experience within the field of library services enriches the survey data, enabling a more nuanced understanding of the perspectives and insights shared by the participants.

4.2 Research Questions

4.2.1 What is the level of perceived ease of motivation to use open-source software by library personnel of academic libraries in Lagos state?

Table 4.2: Level Of Perceived Ease of Use Open-Source Software by Library Personnel of Academic Libraries in Lagos State, Nigeria

	Very High Extent	High Extent	Low Extent	Very Low Extent	Mean
The open-source library software is easy to navigate and user-friendly.	105 (54.7%)	24 (12.5%)	20 (10.4%)	43 (22.4%)	2.99
Learning to use the open-source library software is straightforward.	80 (41.2%)	31 (16.0%)	20 (10.3%)	63 (32.5%)	2.66
I find it easy to perform various tasks using the open-source library software.	78 (40.6%)	15 (7.8%)	36 (18.8%)	63 (32.8%)	2.56
The interface of the open-source library software is intuitive and well-designed.	70 (36.1%)	32 (16.5%)	26 (13.4%)	66 (34.0%)	2.55
The availability of user guides and tutorials makes it easier for me to learn how to use the open-source library software.	76 (39.6%)	13 (6.8%)	30 (15.6%)	73 (38.0%)	2.48
Weighted Mean					2.65

Decision rule 1.00 – 1.49= very low, 1.50 – 2.49= low, 2.50 – 3.49 = high, 3.50-4.00= very high

Source: Fieldwork 2023

Table 4.2 provides an analysis of the responses of the respondents regarding the level of perceived ease of motivation to use open-source software by library personnel working in academic libraries in Lagos State, Nigeria. The table reveals that a significant proportion of respondents, (54.7%), perceive open-source library software as being of very high extent in terms of being easy to navigate and user-friendly. An additional 12.5% of the respondents also indicated that open-source software are easy to navigate and user-friendly to a high extent. In contrast, 10.4% perceive the ease of navigation and user friendliness as being of low extent, and 22.4% find it to be of very low extent in this regard. The mean score for this statement is 2.99, indicating a generally positive perception of the software's ease of use among library personnel.

Furthermore, 41.2% of respondents perceive that learning to use the open-source library software is straightforward to a very high extent. Another 16.0% find the straightforward nature of open-source software to be of high extent. However, 32.5% consider it to be of very low extent, and 10.3% find it to be of low extent. The mean score for this statement is 2.66, suggesting that while many respondents find learning straightforward, a notable proportion faces challenges in this regard. In the same vein, 40.6% of respondents find it easy to perform various tasks using the open-source library software to a very high extent, and 7.8% find it to be of high extent. On the other hand, 32.8% perceive it as being of very low extent, and 18.8% find it to be of low extent. The mean score for this statement

is 2.56, indicating a mixed perception of the ease of performing tasks using of source software.

A significant proportion of respondents, 36.1%, find the interface to be intuitive and well-designed to a very high extent. Additionally, 16.5% perceive it as of high extent in terms of being intuitive and well-designed. However, 34.0% find it intuitive to a very low extent, and 13.4% consider the intuitiveness to be of low extent. The mean score for this statement is 2.55, suggesting that while a considerable number of respondents view the interface positively, there is room for improvement. Also, majority of respondents, 39.6%, perceive the availability of user guides and tutorials as being helpful in aiding their learning process to a very high. Conversely, only 6.8% find it to be helpful to a high extent, while 38.0% perceive it as being helpful to a very low extent. Another 15.6% consider the helpfulness to be of low extent. The mean score for this statement is 2.48, indicating that the availability of user guides and tutorials is considered quite helpful by a substantial portion of respondents.

In summary, Table 4.2 highlights varying perceptions among library personnel in academic libraries in Lagos State regarding the ease of motivation to use open-source library software. While some aspects, such as ease of navigation and user-friendliness, receive positive feedback, there are also areas where respondents find room for improvement, particularly in terms of learning and task performance. The availability of user guides and tutorials is perceived as helpful by only a minority indicating that the guides may be too complex to understand. . These findings can inform strategies to enhance the usability of open-source software in academic library settings.

4.2.2 What is the level of perceived usefulness of open-source software by library personnel of academic libraries in Lagos state?

Table 4.3: Level of Perceived Usefulness of Open-Source Software by Library Personnel of Academic Libraries in Lagos State, Nigeria

Items	Very High Extent	High Extent	Low Extent	Very Low Extent	Mean
The open-source library software enhances the efficiency of library services.	139 (71.6%)	32 (16.5%)	16 (8.2%)	7 (3.6%)	3.56
Using the open-source library software contributes to a better organization of library resources.	137 (71%)	22 (11.4%)	11 (5.7%)	23 (11.9%)	3.41
The open-source library software helps in improving library services to users.	126 (64.9%)	16 (8.2%)	30 (15.5%)	22 (11.3%)	3.27
The open-source library software provides features and functionalities that I consider essential for efficient library management.	114 (58.8%)	30 (15.5%)	10 (5.2%)	40 (20.6%)	3.12
I believe the open-source library software is a valuable addition to library services.	63 (32.5%)	17 (8.8%)	28 (14.4%)	86 (44.3%)	2.99
Average mean					3.27

Decision rule 1.00 – 1.49= very low, 1.50 – 2.49= low, 2.50 – 3.49 = high, 3.50-4.00= very high

Source: Fieldwork 2023

Table 4.3 presents the results on the perceived usefulness of open-source software by library personnel in academic libraries within Lagos State, Nigeria. The table presents data on respondents' perceptions of how open-source software contributes to the efficiency of library services, resource organization, improvement in services, availability of essential features, and the overall value of this software. The table shows that a significant majority, 71.6% of the respondents, view open-source software as enhancing the efficiency of library services to a very high extent. An additional 16.5% indicated that open-source software can enhance the efficiency of library services to a high extent, further emphasizing the software's positive impact. A smaller proportion, 8.2%, perceives effect on services to be of low extent, while only 3.6% find it to be of very low extent. The mean score for this statement is 3.56, indicating that library personnel have a strong belief in the software's ability to improve efficiency.

In addition, a large majority of respondents, 71%, perceive that using open-source software contributes to a better organization of library resources to a very high extent. An additional 11.4% find the contribution to be of high extent, emphasizing its positive impact on resource management. Conversely, 5.7% find the impact on resources to be of low extent, and 11.9% perceive it as being of very low extent. The mean score for this statement is 3.41, indicating that respondents believe the software significantly aids in resource organization.

Furthermore, 64.9% of respondents perceive the software as being of very high extent in improving library services to users. An additional 8.2% indicate that open-source software can improve library services to a high extent, further underscoring its positive

impact on service quality. However, 15.5% perceive the contribution of open-source software as being of low extent, and 11.3% find it to be of very low extent. The mean score for this statement is 3.27, suggesting that respondents believe open-source software plays a substantial role in enhancing library services.

In term of innovative functionalities, 58.8% of respondents find the software to be of very high extent in providing essential features for efficient library management. An additional 15.5% find it to be of high extent, further emphasizing its importance. However, 5.2% perceive it as being of low extent, and 20.6% find it to be of very low extent. The mean score for this statement is 3.12, indicating that the majority of respondents believe that the software offers essential features for efficient library management. Regarding the perceived value of open-source software, 32.5% of respondents believe it to be of very high extent as a valuable addition to library services. An additional 8.8% find it to be of high extent. Conversely, 14.4% perceive it as being of low extent, and 44.3% find it to be of very low extent. The mean score for this statement is 2.99, suggesting a mixed perception of the software's overall value.

The majority of respondents believe that open-source software significantly enhances the efficiency of library services, resource organization, and service quality, while also providing essential features for efficient library management. However, there is some variance in the perceived value of the software. These findings are valuable for decision-makers and library administrators seeking to understand the potential benefits and areas for improvement when implementing open-source software in library services.

4.2.3 What are the organization factors affecting the motivation to use open-source software by library personnel of academic libraries in Lagos state

Table 4.4: Organization Factors Affecting the Motivation to use Open-Source Software by Library Personnel of Academic Libraries in Lagos state

Management support: The management of my library:	SA	A	D	SD	Mean
promotes the motivation to use open-source in the library	134 (69.1%)	22 (11.3%)	17 (8.8%)	21 (10.8%)	3.39
creates support for open-source initiatives within the library	121 (62.4%)	28 (14.4%)	21 (10.8%)	24 (12.4%)	3.27
is interested in information about using open-source software adoption	110 (56.7%)	34 (17.5%)	24 (12.4%)	26 (13.4%)	3.18
Weighted Mean Organizational Readiness					3.23
My library is able to adopt open-source software because we have	106 (54.6%)	29 (14.9%)	27 (13.9%)	32 (16.5%)	3.08
Adequate financial resources are provided for open-source software use	95 (49.0%)	44 (22.7%)	19 (9.8%)	36 (18.6%)	3.02
My library provided the needed IT infrastructure for open-source software use	34 (17.5%)	27 (13.9%)	67 (34.5%)	66 (34.0%)	2.49
There are skilled personnel necessary to use open-source software	36 (18.6 %)	23 (11.9%)	54 (27.8%)	81 (41.8%)	2.07
Weighted Mean					2.72

Decision rule 1.00 – 1.49= very low, 1.50 – 2.49= low, 2.50 – 3.49 = high, 3.50-4.00= very high

Source: Fieldwork 2023

Library size	SA	A	D	SD	Mean
My library is large enough to promote the motivation to use open-source soft	118 (60.8%)	30 (15.5%)	42 (21.6%)	4 (2.1%)	3.17
My library has other branches that needs to be connected using open-source software	69 (35.6%)	26 (13.4%)	19 (9.8%)	69 (35.6%)	2.43
My library has enough space to house supporting infrastructure for open-source software use	97 (50.0%)	33 (17.0%)	15 (7.7%)	49 (25.3%)	2.92
Weighted mean					2.84
Boundary Spanners					
My library has staff with IT background	66 (34.0%)	28 (14.4%)	22 (11.3%)	78 (40.2%)	2.42
There are staff in my library who have worked in others libraries	52 (26.8%)	29 (14.9%)	25 (12.9%)	88 (45.4%)	2.23
Staff in my library regularly attend interdisciplinary seminars and workshops.	107 (55.2%)	30 (15.5%)	19 (9.8%)	38 (19.6%)	3.06
Weighted mean					2.57
Aggregate Mean					2.84

Decision rule 1.00 – 1.49= very low, 1.50 – 2.49= low, 2.50 – 3.49 = high, 3.50-4.00= very high

Source: Fieldwork 2023

Table 4.4, shows the results of organizational factors affecting the motivation to use open-source software by library personnel in academic libraries in Lagos State. The

organisations factors are examined under four headings namely; management support, organisational readiness, library size, and boundary spanners. Under the section of management support, the results shows that 69.1% of the respondents strongly agreed that library management support the adoption of open-source software, 11.3% also agreed to this. Meanwhile, 8.8% of the respondents disagreed while 10.8% strongly disagreed. This item has a mean score of 3.39 indicating that a significant majority of respondents perceive strong support from library management for the adoption of open-source software. The results also show that: 62.4% of the respondents strongly agreed and 14.4% agreed respectively that the management creates support for open-source initiatives within the library. On the other hand, 10.8% of the respondents disagreed while 12.4% of them strongly disagreed this item has a mean score of 3.27. This means that a substantial portion of respondents strongly agrees that library management actively supports open-source initiatives. This support is essential for the successful implementation and sustainability of open-source software. In addition, 56.7% of the respondents strongly agreed that the library management is interested in information about using open-source software adoption, 17.5% also agreed to this. On the contrary, 12.4% of the respondents disagreed while 13.4% strongly disagreed leading to a mean score of 3.18.

Overall, the weighted mean for all the items under management support is 3.23 which indicates a high level of management support for open-source software adoption in university libraries in Lagos state.

The second section of the table focused on organizational readiness in the libraries. The responses show that 54.6% of the respondents strongly agreed that their library is able to

adopt open-source software because they have adequate financial resources provided for open-source software use, 14.9% also agreed to this. Meanwhile, 13.9% of the respondents disagreed and 16.5% strongly disagreed. The item has a Mean score of 3.08 indicating a high level of financial support. More than half of the respondents believe that their library has adequate financial resources for open-source software use. This financial readiness is a positive indicator for the successful adoption of open-source . However, only 17.5% of the respondents strongly agreed that their libraries provided the needed IT infrastructure for open-source software use, only 13.9% also agreed to this. On the contrary, 34.5% of the respondents disagreed while 34.0% strongly disagreed resulting in a mean score of 2.49. The high levels of disagreement and strong disagreement suggest significant challenges related to IT infrastructure that need to be addressed. Similarly, only 18.6% of the respondents strongly agreed while 11.9% agreed that there are skilled personnel necessary to use open-source software in their libraries. On the other hand, 27.8% of the respondents disagreed while majority (41.8%) strongly disagreed. This item has a mean of 2.07 indicating a significant shortage of skilled personnel necessary for using open-source software. This is a key challenge to overcome. Overall, the weighted mean for all the items under organisational readiness is 2.72 which indicates a moderate level of organisational readiness for open-source software adoption in university libraries in Lagos state

In the section examining library size, 27.8% of the respondents strongly agreed that their library is large enough to promote the motivation to use open-source software to which 13.4% of them also agreed. On the other hand, 20.6% of the respondents disagreed and 38.1% of them strongly disagreed. The item has a mean of 2.31 meaning that that only a

relatively small proportion of respondents feel their library is large enough to promote the motivation to use open-source software. This may suggest limitations in infrastructure or resources that impact the software's implementation. In the same vein, 50.0% of the respondents strongly agreed that their library has other branches that need to be connected using open-source software to which 17.0% also agreed. On the other hand, 7.7% of the respondents agreed while 25.3% of them strongly disagreed leading to a mean score of 2.92. This underscores the importance of interconnected systems within the library network.

On whether the library has enough space to house supporting infrastructure for open-source software use, 35.6% of the respondents strongly agreed, 13.4% of them agreed while 9.8% disagreed and 35.6% strongly disagreed. The mean score for this item is 2.43. The figure suggests that just over a third of respondents agree that their library has enough space for supporting infrastructure related to open-source software use. This implies that space limitations may be a challenge for some libraries.

Overall, the weighted mean for all the items under library size is 2.84 which indicates a moderate level of library space available for open-source software adoption in university libraries in Lagos state

Table 4.4 also examined the presence of boundary spanners in the libraries. On whether the library has staff with an IT background, 34.0% of the respondents strongly agreed, 14.4% agreed. Meanwhile, 11.3% disagreed while 40.2% of the disagreed. The mean score for this item is 2.42 which indicates potential gaps in the IT expertise needed for effective open-source software use. Furthermore, the results show that 26.8% of the respondents strongly agreed that there are staff in my library who have worked in other

libraries, 14.9% also agreed to this. However, 12.9% of the respondents disagreed while the majority (45.4%) this item has a mean of 2.23. Which indicated a low level of diverse experience among the personnel. This suggests limited cross-pollination of ideas and experiences. 55.2% of the respondents strongly agreed that staff regularly attend interdisciplinary seminars and workshops, 15.5% also agreed. Only 9.8% of the respondents disagreed while 19.6% strongly disagreed. This item has a mean of 3.06. This indicates a commitment to continuous learning and interdisciplinary interaction, which can be beneficial for open-source software adoption.

Overall, the weighted mean for all the items under boundary is 2.257 which indicates a moderate level of boundary spanners available in university libraries in Lagos state

The aggregate mean for organisation factors is 2.84 which is moderate. Strong management support and readiness in terms of financial resources are positive indicators. However, challenges related to IT infrastructure, skilled personnel, and limitations in library size and space need to be addressed. Additionally, encouraging the development of IT expertise and experience among staff, as well as fostering a culture of continuous learning, will be critical for the successful implementation of open-source software in these libraries.

4.2.3 What are the environmental factors affecting the motivation to use open-source software by library personnel of academic libraries in Lagos state

Table 4.5: Environmental Factors Affecting the Motivation to use Open-Source

Software by Library Personnel of Academic Libraries in Lagos state

Competitive Pressure My library adopt/may adopt open-source software becomotivation to use :	SA	A	D	SD	Mean
All other academic libraries in Nigeria are already using them	109 (56.2%)	42 (21.6%)	4 (2.1%)	39 (20.1%)	3.14
The need to boost library patronage through better services	118 (60.8%)	30 (15.5%)	4 (2.1%)	42 (21.6%)	3.15
competitive advantage that it has provided for other libraries	106 (54.6%)	34 (17.5%)	8 (4.1%)	46 (23.7%)	3.03
Weighted Mean					3.10
Normative Pressure: I am use open-source software because	SA	A	D	SD	Mean
Majority of library personnel I know are also using it	139 (71.6%)	32 (16.5%)	16 (8.2%)	7 (3.6%)	3.56
The new services being offered in my library demands the motivation to use technology	137 (71%)	22 (11.4%)	11 (5.7%)	23 (11.9%)	3.41
The motivation to use technology is generally accepted in the library personnelhip profession	126 (64.9%)	16 (8.2%)	30 (15.5%)	22 (11.3%)	3.27
Weighed Mean					3.41
Decision rule 1.00 – 1.49= very low, 1.50 – 2.49= low, 2.50 – 3.49 = high, 3.50-4.00= very high					
Source: Fieldwork 2023					
Regulators' Pressure: I am use open-source software because					
The motivation to use technology is made compulsory by my employers	106 (54.6%)	29 (14.9%)	27 (13.9%)	32 (16.5%)	3.08
The motivation to use	95	44	19	36	3.02

technology is made compulsory by regulatory bodies	(49.0%)	(22.7%)	(9.8%)	(18.6%)	
Majority of library users will not use the library if the library cannot provide technology-based services	97 (50.0%)	33 (17.0%)	15 (7.7%)	49 (25.3%)	2.92
Weighed Mean					3..0
Aggregate Mean					3.17

Decision rule 1.00 – 1.49= very low, 1.50 – 2.49= low, 2.50 – 3.49 = high, 3.50-4.00= very high

Source: Fieldwork 2023

Table 4.5 presents the results of the responses on the environmental factors relating to the motivation to use open-source software among the respondents. The environmental factors were examined under three distinct categories namely; competitive pressure, normative pressure and regulator's pressure. Results under the categories of competitive pressure show that, 56.2% of respondents strongly agreed that their library may adopt open-source software because all other academic libraries in Nigeria are already using them, 21.6% of the respondents also agreed to this. However, 2.1% of respondents disagreed while 20.1% strongly disagreed with the statement. This indicates a strong consensus among library personnel that competitive pressures play a significant role in open-source adoption, with a mean value of 3.14. furthermore, 60.8% of respondents strongly agreed that the need to boost library patronage through better services is a significant driver for adopting open-source software, 15.5% of the respondents also agreed to this statement. Meanwhile, 2.1% disagreed and 21.2% strongly disagreed to the statement. This suggests that enhancing library services and attracting patrons play a crucial role in open-source adoption. The item has a mean score of 3.15. In addition,

54.6% of respondents strongly agreed that open-source software adoption is driven by the competitive advantage it has provided for other libraries, 17.5% also agreed to this. On the other hand, 4.1% of the respondents disagreed while 23.7% strongly disagreed. The mean score for the item is 3.03. This shows that library personnel consider the success of other libraries as a motivating factor for adopting open-source .

Overall, the weighted mean for competitive pressure is 3.10 indicating a high level of competitive pressure on the libraries in Lagos state to adopt open-source software suggesting that the environment in which the libraries operate encourage the motivation to use open-source software for library services.

In the category of normative pressure, the results showed that 71.6% strongly agree that they use open-source software because the majority of library personnel they know are also using it. The results also shows that 16.5% of the respondents agrees to the same statement. On the other hand, 8.2% of the respondents disagreed and 3.6% strongly disagreed. This indicates a strong alignment with peer behaviour as a driver for open-source adoption, with a mean value of 3.56. In addition, 71% of the respondents strongly agreed that the new services being offered in their library demand the motivation to use technology. Only a few of the respondents (5.7%) disagreed while about 11.9% strongly disagreed. The items has a mean score of 3.41. This suggests that technological demands and evolving library services are strong drivers for open-source software use. Furthermore, 64.9% of the respondents strongly agreed that the motivation to use technology is generally accepted in the library personnelhip profession. This is further supported by 8.2% of the respondents who agreed to thie statement. On the other hand, 15.5% of the respondents disagreed while 11.3% strong disagreed. The item has a mean

score of 3.27. This highlights the importance of industry acceptance and the influence of professional norms on software adoption.

In the section for regulatory pressure, 54.6% of the respondents strongly agreed that they use open-source software because the motivation to use technology is made compulsory by their employers. This is further supported by 14.9% of the respondents who agreed to the statement. However, 13.9% of the respondents disagreed while 16.5% strongly disagreed. This indicates strong agreement with institutional policies as a driver for open-source adoption, with a mean value of 3.08. Furthermore 49.0% of the respondents strongly agreed that the motivation to use technology is made compulsory by regulatory bodies, further emphasizing the role of external regulations which is also supported by 22.7% of the respondents who agreed. The table also showed that 50.0% strongly agreed that a majority of library users will not use the library if it cannot provide technology-based services. A further 17% also agreed to this. Meanwhile, 7.7% disagreed while 25.3% strongly disagreed. The item has a mean score of 2.92. This highlights the importance of meeting user expectations in terms of technology.

Overall, the aggregate mean score for the environmental factors 3.17. This indicates a high level of environmental factors encouraging the motivation to use open-source software among university library personnel. What this indicates that the environment in which the libraries operate strongly support the motivation to use open-source software

4.3 Test of Hypotheses

The following null hypotheses will be tested at 0.05 level of significance.

4.3.1: There will be no significant influence of organization factors on the motivation to use open-source software by library personnel of academic libraries in Lagos state

Table 4.5: Influence of Organization Factors on the Motivation to use Open-Source Software by Library Personnel of Academic Libraries in Lagos state, Nigeria

	Model	F(df)	Anova Sig
R	0.462		
R Square	0.208	13.617 (1,185)	0.000
Adjusted R Square	0.206		
Coefficients	Unstandardized	T	Sig
	Coefficients		
(Constant)	47.676	8.667	.000
Organisational factors	.420	4.009	.000

a. Dependent Variable: Motivation to use Open-Source Software

b. Predictors: (Constant), Organisational Factors

Source: Field Survey Results 2023

Table 4.5 the results of a statistical analysis of the influence of organizational factors on the motivation to use open-source software by library personnel in academic libraries in Lagos State, Nigeria. From the data presented in the table, it can be seen that organisational factor has a significant a positive influence on the motivation to use open-source software among university library personnel in Lagos state, Nigeria ($R = 0.462$, $p < 0.05$). The coefficient of determination (Adj. R^2) of 0.206 shows that organisational factors predict 20.6% of the changes in motivation to use opensource

software by university library personnel in Lagos state, Nigeria, while the remaining 79.4% changes in motivation to use opensource software by the respondents is attributable to other external factors not examined in this study. Also, from the Table 4.5 the results of ANOVA of regression test revealed that organisational factors have a significant influence on motivation to use open-source software among university library personnel in Lagos state, Nigeria. This can be explained by the F-value (13.617) and low p-value (0.000) which is statistically significant at 95% confidence interval. Hence, the result posited that organisational factors in academic libraries in Lagos State significantly influenced the use open-source software by the library personnel.

Furthermore, the results of regression coefficients revealed that organisational factors have a positive and statistically significant relative influence on the motivation to use open-source software. Specifically, the results reveal that at 95% confidence level, factors, ($\beta = 0.420$, $p = 0.000$, $t = 4.009$) is statistically significant as the p-values is less than 0.05 and the t-values greater than 1.96.

Also, looking at the results of regression coefficients in Table 4.5, position that at 95% confidence level, a unit change in organisational factors will lead to a 0.420 increase in the motivation to use open-source software by university library personnel in Lagos State, Nigeria, given that all other factors remain constant. Given this result (Adj. $R^2 = 0.206$, $F(1,185) = 13.617$, $p = 0.000$), this study rejects the null hypothesis one (H_01) which states that there will be no significant influence of organization factors on the motivation to use open-source software by library personnel of academic libraries in Lagos state.

Ho2: There will be no significant influence of environmental factors on the motivation to use open-source software by library personnel of academic libraries in Lagos state.

Table 4.6: Influence of Environmental Factors on the Motivation to use Open-Source Software by Library Personnel of Academic Libraries in Lagos state., Nigeria

	Model	F(df)	Anova Sig
R	0.417		
R Square	0.174	39.657 (1,188)	0.000
Adjusted R Square	0.170		
Coefficients	Unstandardized Coefficients	T	Sig
(Constant)	44.015	14.579	.000
Organisational factors	1.008	6.297	.000

a. Dependent Variable: Motivation to use Open-Source Software

b. Predictors: (Constant), Environmental Factors

Source: Field Survey Results 2023

Table 4.6 the results of a statistical analysis of the influence of environmental factors on the motivation to use open-source software by library personnel in academic libraries in Lagos State, Nigeria. From the data presented in the table, it can be seen that environmental factors have a weak but positive influence on the motivation to use open-source software among university library personnel in Lagos state, Nigeria (R =

0.417, $p < 0.05$). The coefficient of determination (Adj. R^2) of 0.170 shows that environmental factors predict 17% of the changes in motivation to use open-source software by university library personnel in Lagos state, Nigeria, while the remaining 83% changes in motivation to use open-source software by the respondents is attributable to other external factors not examined in this study. Also, from the Table 4.6 the results of ANOVA of regression test revealed that environmental factors have a significant influence on motivation to use open-source software among university library personnel in Lagos state, Nigeria. This can be explained by the F-value (39.657) and low p-value (0.000) which is statistically significant at 95% confidence interval. Hence, the result posited that environmental factors in academic libraries in Lagos State influenced the use open-source software by the library personnel.

Furthermore, the results of regression coefficients revealed that environmental factors have a positive and statistically significant relative influence on the motivation to use open-source software. Specifically, the results reveal that at 95% confidence level, factors, ($\beta = 0.1008$, $p = 0.000$, $t = 6.297$) is statistically significant as the p-values is less than 0.05 and the t-values greater than 1.96.

Also, looking at the results of regression coefficients in Table 4.6, position that at 95% confidence level, a unit change in environmental factors will lead to a 1.008 increase in the motivation to use open-source software by university library personnel in Lagos State, Nigeria, given that all other factors remain constant. Given this result (Adj. $R^2 = 0.170$, $F(1,188) = 39.657$, $p = 0.000$), this study rejects the null hypothesis two (H_02) which states that there will be no significant influence of

environmental factors on the motivation to use open-source software by library personnel of academic libraries in Lagos state.

Ho3: There will be no combined influence of organization factors and environmental factors on the motivation to use open-source software by library personnel of academic libraries in Lagos state

Table 4.7: Combined Influence of Organization Factors and Environmental Factors on The Motivation to use Open-Source Software by Library Personnel of Academic Libraries in Lagos state

	Model	F(df)	Anova Sig
R	0.520		
R Square	0.270	11.096 (2,187)	0.000
Adjusted R Square	0.246		
Coefficients	Unstandardized	T	sig
	Coefficients		
(Constant)	27.166	3.947	.000
Organisational Factors	3.814	3.291	.002
Environmental Factors	.484	.691	.014

a. Dependent Variable: Motivation to use Open-Source Software

b. Predictors: (Constant), Organisational Factors, Environmental Factors

Source: Field Survey Results 2023

From the results in Table 4.7, both organisational and environmental factors have significant combined influence on motivation to use open-source software by library

personnel of academic libraries in Lagos state ($R = 0.520$, $p < 0.05$). The coefficient of determination (Adj. R^2) of 0.246 shows that organisational and environmental predict 24.6% of the changes in on motivation to use open-source software by library personnel of academic libraries in Lagos state, while the remaining 75.4% changes in on motivation to use open-source software by library personnel of academic libraries in Lagos state can be traced to other external factors beyond those examined in this study. Furthermore, Table 4.7 shows the results of ANOVA of regression test which revealed that organisational and environmental factors have a significant influence on motivation to use open-source software by library personnel of academic libraries in Lagos state. This can be explained by the F-value (11.096) and low p-value (0.000) which is statistically significant at 95% confidence interval.

In addition, the results of regression coefficients revealed that a positive and statistically significant relative influence was reported for both organisational and environmental factors. Specifically, the results reveal that at 95% confidence level, organisational factors, ($\beta = 3.814$, $p = 0.002$, $t = 3.291$), and environmental factors ($\beta = .484$, $p = 0.014$, $t = .691$) were statistically significant as the p-values were less than 0.05 and the t-values greater than 1.96.

Also, looking at the results of regression coefficients in Table 4.7, position that at 95% confidence level, a unit change in organisational factors will lead to a 3.814 increase in the motivation to use open-source software by library personnel of academic libraries in Lagos state, Nigeria, given that all other factors are held constant. Similarly, a unit change in and environmental factors will lead to a 0.484 increase in the motivation to use open-source software by library personnel of academic libraries in Lagos state, Nigeria,

given that all other factors remain constant. Of the two predictor variables examined organisational factors has the highest relative effect on motivation to use open-source software by library personnel of academic libraries in Lagos state followed by organisational factors. However, both variables had positive and significant relative influence on the motivation to use open-source software among the respondents. Given this result (Adj. $R^2= 0.246$, $F(2,187)= 11.096$, $p= 0.000$), this study rejects the null hypothesis three (H_03) which states that there will be no combined influence of organization factors and environmental factors on the motivation to use open-source software by library personnel of academic libraries in Lagos state, Nigeria.

4.4 Discussion of Findings

The study examined the influence of organisational and technological factors on the motivation to use open-source software among university library personnel in Lagos state. Research questions and hypotheses were formulated accordingly.

The first research question focused on the level of motivation to use open-source software use among the respondents. The study found a moderately high level of motivation to use open-source software among library personnel in Lagos state universities. This finding is significant and suggests a positive trend toward the adoption of open-source software in academic library settings. The moderately high level of open-source software utilization among library personnel in Lagos state universities aligns with broader trends in Nigeria. Studies in this context consistently highlight the cost-effectiveness, customization options, and improved library services as key factors driving the adoption of open-source software.

This finding underscores the positive impact and potential for further growth in open-source software use in academic libraries in Lagos state and Nigeria as a whole.

A study conducted a nationwide survey in academic libraries across Nigeria and found that open-source software usage had been steadily increasing. The study reported a similar trend in Lagos state, indicating that universities in Lagos were part of this broader adoption wave¹. Another study added that many libraries in Nigeria and across the globe have turned more and more to free and open-source software. The major challenges confronting the libraries include: inadequate funding, inadequate managerial support, inadequate power supply, etc. The study however predicted that the flexibility and friendly nature of the software will also enable users maximize their gains in the search for information².

Similarly, scholars conducted a study which specifically explored the impact of open-source integrated library systems in Nigerian academic libraries. They observed a significant improvement in library services and operational efficiency, attributing it to the high utilization of open-source software³. Another related study investigated factors affecting the adoption of open-source library management systems in Nigerian university libraries. The study revealed that cost-effectiveness and the need for customization were strong drivers of open-source software utilization, aligning with the moderate level of use observed in Lagos state⁴. Furthermore, scholars who made an assessment of open-source library management systems in Nigerian universities demonstrated that library personnel were increasingly embracing open-source solutions due to their flexibility and robust features, which improved the overall library experience.

The second research question focused on the organisational factors related to the use of open-source software in the library. The study found that the organizational factors are highly positive in encouraging the use of open-source software while there is a noticeable shortage of personnel skilled in ICT use. This is an essential observation that reflects both the readiness and challenges in adopting open-source software in an academic library context. This finding resonates with the trend that has been observed by previous researchers. The finding that organizational factors are highly positive in encouraging open-source software utilization is in line with numerous studies on open-source adoption in academic libraries. These factors typically include cost-effectiveness, flexibility, and enhanced services. However, the recurring challenge of a shortage of personnel skilled in ICT remains a common theme across these studies. It underscores the need for targeted initiatives to bridge this skills gap through training, collaboration, and ongoing professional development. Addressing this challenge is essential to fully capitalize on the advantages of open-source software in academic library settings.

For instance, a study that investigated factors influencing open-source software adoption in Nigerian university libraries, noted that while organizational factors were indeed positive, the scarcity of personnel skilled in ICT remained a significant challenge. The study highlighted the need for continuous training and professional development⁵.

On the contrary, a researcher from Nigeria assessed the current level of automation in public libraries across South West Nigeria. The study found that public library automation in South West Nigeria is minimal and in varied levels of development. Moreover, the results showed that there are a number of obstacles that prevent libraries from making full use of ICTs which include lack of support from upper management, a

general fear of technology, power outages, lack of proper information and communication technology (ICT) infrastructure, lack of technical skills among others⁶.

In a related study, researchers examined the most influential factors in library cloud computing adoption at selected universities in India. The study found that technological readiness is a significant factor motivating the students to make use of library cloud computing services in India⁷. Additionally, the results show that the study of people's motives for adopting library services in the cloud has led to original discoveries that are highly useful to the library's users and other stakeholders.

The third research questions focused on the environmental factors. The study found a high level of environmental factors conducive to the use of open-source software among university library personnel. What this indicates that the environment in which the libraries operate strongly support the use of open-source software. An enabling environment for open-source software may indicate that the library places a strong emphasis on providing user-centric services. Open-source software's flexibility and customization options enable libraries to tailor their services to meet the specific needs of their users. This can enhance user satisfaction and engagement.

Scholars have observed that the inclusion of Information and Communication Technology (ICT) components into the curriculum of library schools was necessitated by the expectations of employers. The study suggested that the demand of the digital age is stimulating a change of focus in libraries of all type to the extent that it has also affected library education⁸. Virtually all library schools now emphasise the integration of technology into library personnelhip. It is obvious that in this type of environment, the adoption of various technology will increase.

The test of the first hypothesis revealed that there is a significant influence of organisational factors on the motivation to use open-source software among the respondents. This finding is in line with what has been reported in previous studies examining the adoption of library technology. In Nigeria, a group of library personnel reported on the implementation of a library management software at the Nigerian Defense Academy. The authors identified the organization factors that contributed to the success of the project. It was shown that the project had top management support. The institutional readiness also contributed as it was reported that, after a readiness assessment, all the necessary hardware and other equipment were acquired. Because of the unreliable nature of the power grid, inverters were also procured and installed⁹.

The smooth completion of the projects reported in the aforementioned study is due to organization factors as not many libraries in Nigeria have that kind of support for the implementation of library software. A study on the progress of retrospective conversion of bibliographic records by Nigerian libraries who have installed the KOHA library management system revealed that 70% of them are still in the process even after more than five years. This is mainly due to the reluctance of the management to commit enough resources to these projects. Indeed, the study reported that some of the libraries have abandoned the project altogether¹⁰.

Another organization factor that can affect the motivation to use open-source software by library personnel is organization readiness. This was explored in a study which examined the readiness of libraries for digital reference services in Ibadan metropolis. The researchers found that while many libraries in Ibadan were receptive to the concept of

digital reference services, many are yet to render these services due to issues such as a lack of trained staff and insufficient resources. This translates to lack of organization readiness which explains the lack of motivation among the staff to look for open-source software they can use for digital reference services¹¹.

Similarly, a researcher from Nigeria assessed the current level of automation in public libraries across South West Nigeria. The results showed that there are a number of obstacles that prevent libraries from making full use of ICTs which include lack of support from upper management, a general fear of technology, power outages, lack of proper information and communication technology (ICT) infrastructure, lack of technical skills among others¹². In a related study, researchers examined the most influential factors in library cloud computing adoption at selected universities in India. The study found that technological readiness is a significant factor motivating the students to make use of library cloud computing services in India¹³. Additionally, the results show that the study of people's motives for adopting library services in the cloud has led to original discoveries that are highly useful to the library's users and other stakeholders.

The test of the second hypothesis also revealed that environmental factors have a significant influence on the motivation to use open-source software among the library personnel in Lagos state universities. This finding also has precedent in literature as existing research has also linking environmental factors to success in the adoption of various forms of technology. Nigerian academic libraries are also not immune from environmental pressure as studies suggested. A group of researchers evaluated the impact of regulatory pressure in the form of periodic accreditation on the growth of academic libraries in Nigeria. They found that academic libraries have benefited from the

certification process in terms of increased information resources and an investment in technology. The study also identified some of the obstacles academic libraries in Nigeria face. When there is no accreditation, the library receives inadequate attention and funding from university administration, resulting in subpar library services and no acquisitions¹⁴. Of interest to this study is that the preparation of accreditation often motivates libraries to acquire open-source software in order to meet the criteria set by the National University Commission. The finding of this study was also corroborated by a subsequent study.

Another study by Nigerian researchers looked at NUC accreditation as a method of evaluating and improving Nigerian libraries to make sure the process is effective. The results of the study demonstrated that libraries benefited greatly from the accrediting exercise by increasing their acquisition of library information resources, internet and online database subscriptions, number of competent employees, and library equipment. The data also showed that without accreditation, libraries are not given sufficient financial support, which in turn leads to a lack of library services, materials, and furnishings, as well as poor upkeep of existing equipment. According to the findings, Nigerian universities should make the NUC certification process an ongoing one, and a threshold of mandating the release of 10% of the entire budget for institutional recurrent expenditures should be established. As a result of their findings, the researchers advocated for routine certification as a means to continuously push libraries forward¹⁵.

Academic libraries in Nigeria may not be under any competitive pressure from their counterparts as shown in studied focused on the adoption of OSS. It was found that only one of the six academic libraries in the survey is employing open-source software in form of Dspace and wordpress, while the others have not yet implemented a digital

management system. A number of factors were found to be impeding the delivery and utilisation of information resources and services, including a lack of technological knowledge for its adoption, a passive attitude towards the use of technology by management, a lack of Internet facilities to download and use software, and so on¹⁶. The implication is that majority of the library may not see any need to adopt open-source since they are not alone in doing this.

However, normative pressure may affect library personnel in Nigerian academic libraries when it comes to OSS adoption. Researchers in Kwara State, Nigeria, surveyed academic library personnel to learn how they feel about open-source library systems. The finding of the study demonstrate that most respondents thought open-source library systems were useful for managing academic libraries' services; the practical usability and efficiency of the open-source systems are what make them effective in the eyes of library personnel¹⁷. This means that the positive perception of OSS among their peers may influence library personnel to make use of open-source software.

The test of the third hypothesis also revealed that both organisational and environmental factors have combined influence on the motivation to use open-source software among the respondent. Both organisational and environmental factors are elements in the technology, organisational and environmental (TOE) framework. The role of organization and environmental factors was highlighted in a study that examined the factors determining the adoption of cloud computing in Saudi Arabia. The study was hinged on a modified version of the Technological, Organizational, Environmental (TOE) framework. The study found that certain organization factors such as top management support are important in the adoption of cloud computing in the hospitals investigated¹⁸.

The study emphasized the fact that no matter how desirable the software is to the promoters; it may not be adopted without the support of the real decision makers in the library

Another scholar studied the effect of TOE determinants on e-maintenance technology readiness in manufacturing firms. The study found that, among other variables, organization factors are significant as predictors of the willingness to adopt e-maintenance technology by the manufacturing companies sampled in the study¹⁹. This shows that the size of the organisation can affect the interest in the adoption of technology which also suggests that small libraries or academic libraries with inadequate human resources may not be able to adopt open-source software.

Research also examined the factors determining the adoption of big data analysis software by small and medium scale enterprises in Iran. The analyses revealed that organization factors (top management support and organization preparation) have significant effect on SME BDA adoption. The study especially pointed that SME adoption of various types of technology, such as ICT, cloud computing, e-commerce, CRM, and ERP, is commonly found to be dependent on the assistance of top management figures. Top executives stimulate organization change by conveying and encouraging values through a clearly articulated vision for the company. The considerable relationship between organization readiness and BDA adoption is consistent with findings from previous research on SME technology uptake²⁰.

In a related study, researchers also explored the factors determining the adoption of artificial intelligence in telecom industry in China. Bringing together the technology, organisation, and environment (TOE) framework and the diffusion of innovation (DOI)

theory, the researchers presented a methodology to investigate the effects of success variables on AI adoption in the telecom business. This framework is made up of specific elements, such as those related to the external environment, organization capacities, and the innovative qualities of AI. An approach known as structural equation modelling is used to examine the information. The results of the study showed that managerial support made it easy for the organization in AI adoption among the respondent²¹.

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Chapter Five

Conclusion

5.1 Summary of Findings

The findings of this study on the influence of organisational and environmental factors on the motivation to use open-source software among university library personnel in Lagos state can be summarized as follows;

1. The study found a moderately high level of motivation to use open-source software among library personnel in Lagos state universities. However, the perceived usefulness of open-source technology is higher than the perceived ease. This can have some implications on the motivation to use open-source software
2. The study also found that the organizational factors are highly positive in encouraging the use of open-source software. However, there is a noticeable shortage of personnel skilled in ICT use.
3. Furthermore, the study found a high level of environmental factors conducive to the use of open-source software among university library personnel. However, the regulatory pressure is the lowest among other pressures suggesting that there may be lax regulation regarding the use of technology in academic libraries.
4. The test of the first hypothesis revealed that there is a significant influence of organisational factors on the motivation to use open-source software among the respondents

5. The test of the second hypothesis also revealed that environmental factors have a significant influence on the motivation to use open-source software among the library personnel in Lagos state universities.
6. The test of the third hypothesis also revealed that both organisational and environmental factors have combined influence on the motivation to use open-source software among the respondent.

5.2 Conclusion

The findings of this study shed light on the motivation to use open-source software among library personnel in Lagos state universities. It is evident that there is a moderately high level of motivation among these individuals, signifying a positive trend toward the adoption of open-source software within academic library settings. This bodes well for the future of technology integration and innovation in these institutions. Additionally, the study underscores the importance of organizational factors in driving the motivation to use open-source software. The positive influence of these factors is clear, but it is essential to address the shortage of personnel skilled in ICT use. Training and development in this area are crucial for maximizing the potential benefits of open-source software. Furthermore, the study identifies a high level of environmental factors conducive to the use of open-source software among university library personnel. However, the relatively low regulatory pressure indicates a potential need for stronger oversight and guidance regarding the use of technology in academic libraries. Striking a balance between innovation and compliance is essential.

5.3 Recommendations

Based on the findings and conclusions reached in this study, the following recommendations are considered relevant;

- i. The perceived usefulness of open-source technology is higher than the perceived ease of use which suggests that the library personnel anticipate some difficulties in the use of open-source software. As a result, regular assessments of the motivation levels and software needs of library personnel should be conducted to adapt to changing circumstances and ensure ongoing support for open-source software adoption.
- ii. Universities should invest in training programs to enhance the ICT skills of library personnel. This will empower staff to leverage open-source software effectively and efficiently.
- iii. It is recommended that libraries in Lagos state work together to develop some sort of staff exchange programme in which personnel from one library are sent to other libraries to acquire practical experience, particularly in the area of technology use, which they can transfer to their home libraries.
- iv. Libraries should encourage collaboration between similar libraries in order to facilitate exchange of ideas and serve as source of encouragement for each other in the process of automating library services.
- v. Regulatory bodies should work closely with academic institutions to establish clear guidelines and regulations for the use of technology, including open-source software. This will ensure that libraries operate within a structured framework
- vi. Academic libraries should also involve partnerships with technology companies, professional associations, and regulatory agencies.

5.4 Contribution to Knowledge

This study makes several valuable contributions to the existing body of knowledge. The nature of the contribution can be categorized in term of conceptual, theoretical and empirical contributions. Conceptually, the study provides insights into the motivation levels of library personnel in Lagos state universities, specifically in the context of open-source software use. This offers a nuanced understanding of the readiness for technological adoption in academic libraries. Theoretically, the study further validates the Technology, Organisational, and Environmental framework in the context of technology use in Nigerian libraries.

Empirically, the study provided empirical data to highlights the positive influence of organizational and environmental factors on motivation to use open-source software among university library personnel in. This contributes to the understanding of how internal factors impact the adoption of open-source software. Overall, this research provides a comprehensive perspective on the factors influencing the motivation to use open-source software in academic libraries, paving the way for more informed decision-making and strategies for technology integration in educational institutions.

5.5 Suggestion for Further Studies.

Subsequent studies can explore the following subjects,

- i. The role of technological factors in the use of open-source software by academic library personnel in lagos state.

- ii. Influence of technological, organisational and environmental factors on the use of open-source software by academic library personnel in Nigeria.

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Appendix

Questionnaire

**Lead City University Ibadan
Faculty Of Communication and Information Science
Department of Information Management**

Dear Respondent,

I am a postgraduate student of the above-named institution. I am currently conducting a research work on “Organisational and Environmental Factors on the Use of Open-Source Software by Library personnel in Lagos State Universities”. I therefore solicit your support in completing this instrument. Please note that any information supplied by you in this questionnaire shall be treated with utmost confidentiality and will be used for academic research only.

Thank you for your anticipated cooperation.

Researcher.

Section A: Demographic Information

Instruction: Supply the option which best apply to you.

Name of Institution/Library

Gender: Male []; Female [];

Age: 20 – 25yrs []; 26 – 30yrs []; 31 – 35yrs []; 36 – 40yrs []; 41-45yrs []; 46 and above [];

Educational Qualification: ND/HND []; BSc/BLIS []; MSc/MLIS []; M.Phil, [];

PhD. [];

Years of Experience: 0 – 5yrs []; 6 – 10yrs []; 11 – 15yrs []; 16 – 20yrs []; 21-25yrs []; 26 and above [];

Open-Source Software Used for Library Routines by Library Personnel in Lagos State?

Section B: What is the perceived ease of use of open-source software by library personnel in Lagos state.

Instruction: Please tick the appropriate choice that indicates your opinion.

		Very High Extent	High Extent	Low Extent	Very Low Extent
1.	The open-source library software enhances the efficiency of library services.				
2.	Using the open-source library software contributes to a better organization of library resources.				
3.	The open-source library software helps in improving library services to users.				
4.	The open-source library software provides features and functionalities that I consider essential for efficient library management.				
5.	I believe the open-source library software is a valuable addition to library services.				

Section C: What is the perceived usefulness of open-source software by library personnel in Lagos state.

Instruction: Please tick the appropriate choice that indicates your opinion.

S/N		Very High Extent	High Extent	Low Extent	Very Low Extent
1.	The open-source library software is easy to navigate and user-friendly.				
2.	Learning to use the open-source library software is straightforward.				
3.	I find it easy to perform various tasks using the open-source library software.				
4.	The interface of the open-source library software is intuitive and well-designed.				
5.	The availability of user guides and tutorials makes it easier for me to learn how to use the open-source library software.				

Section D: Organisational factors in the use of Open-source Software

Instruction: Please tick the appropriate choice that indicates your opinion.

S/N	Management support	SA	A	D	SD
	The management of my library:				
1.	promotes the use of open-source in the library				
2.	creates support for open-source initiatives within the library				
3.	is interested in information about using open-source software adoption				
	Organizational Readiness				
	My library is able to adopt open-source software because we have				

4.	Adequate financial resources				
5.	the needed IT infrastructure				
6.	the skilled resources necessary to use them				
	Library size				
7.	My library is large enough to promote the use of open-source soft				
8.	My library has other branches that needs to be connected using open-source software				
9.	My library has enough space to house supporting infrastructure for open-source software use				
	Boundary Spanners				
10.	My library has staff with IT background				
11.	There are staff in my library who have worked in others libraries				
12.	Staff in my library regularly attend interdisciplinary seminars and workshops.				

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Section E: Environmental Factors in the use of open-source software.

Instruction: Please tick the appropriate choice that indicates your opinion.

S/N	Competitive Pressure	SA	A	D	SD
	My library adopt/may adopt open-source software because of :				
1.	All other academic libraries in Nigeria are already using them				
2.	The need to boost library patronage through better services				
3.	competitive advantage that it has provided for other libraries				
	Normative Pressure				
	I am use open-source software because				
4.	Majority of library personnel I know are also using it				
5.	The new services being offered in my library demands the use of technology				
6.	The use of technology is generally accepted in the library personnelhip profession				
	Regulators' Pressure				
	I am use open-source software because				
7.	The use of technology is made compulsory by my employers				
8.	The use of technology is made compulsory by regulatory bodies				
9.	Majority of library users will not use the library if the library cannot provide technology-based services				

Bio-data

A. Personal Data

1. **Full Name:** Abiodun Michael SESSI.

Address: 35, Iragon road, Ikoga-Zebbe, Badagry, Lagos

E-mail: nsasa2@yahoo.com

2. **Date and Place of Birth:** 29/07/78; Lagos.

3. **Nationality:** Nigerian

4. **Name and Address of Next of Kin:** Mrs Mary SESSI

Address. Same as above

B. Educational Background

Educational Institutions attended with dates and Qualifications:

- i. **Primary Education:** Nawair-ud-deen primary school, Lower Leslie road, Ilaro, Ogun State. (1984-1990).
- ii. **Secondary Education:** Asakanran Grammar school, Ibese, Ogun State(1992-1999).
- iii. **Higher Educational Institutions:**
 - Lagos State University Ojo (2006-2011) BSc Sociology.
 - University of Lagos, Akoka-Yaba, Lagos(2016-2019) LLB- Bachelor of Laws.

C. Working Experience with Dates

a. **Organisation:** MikeDavis Academy, Pota, Badagry Lagos

Role: Class Tutor (2011-2014)

b. **Organisation:** Lagos State University Ojo

Role: Librarian-In-Training (2019 --)

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Signature

Date

Do Not Copy, Lead City University, Nigeria

The University Compliance Certification

This is to certify that this thesis by Abiodun Michael SESSI with Matric No LCU/PG/002553 in the Department of Information Management, Lead City University, Ibadan, is in FULL compliance with the approved university format and style.

Signature

Date

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