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# A Study of Nigerian Librarians' Attitude to Open Source Software

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# **A STUDY OF NIGERIAN LIBRARIANS' ATTITUDE TO OPEN SOURCE SOFTWARE**

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## ABSTRACT

This paper discussed librarians' attitudes towards open source software. Questionnaires were the research instrument used. One thousand (1000) questionnaires were administered out of which nine hundred and twenty (920) were returned and used for the study which represents a return rate of ninety-two percent (92%). Responses were analysed using simple percentages and results were presented in tables and charts.

The study revealed that Nigerian Librarians are familiar with open source, proprietary software and are strongly in favour of open source software. The study also revealed that the Android Operating System and Windows Operating System are the most popular operating system for mobile and desktop computers respectively. It was also revealed that when choosing software, respondents' primary concern was ease of use.

Conclusions and recommendations were made based on the findings.

**Keywords:** Software, Open Source, Librarians, Proprietary Software, Free and Open Source Software

## INTRODUCTION

Computers and other digital devices are deeply embedded in every aspect of human existence. These digital devices run on software. This therefore implies that software is an integral part of modern day life. This software is either open access or proprietary software. Open access software is all about freedom and ease of access and to this end the source code of the software is made freely available to any interested party. Software that does not provide the source code is called proprietary software. Proprietary software is distributed under a license that protects the proprietary rights of the publisher by preventing (or at least limiting) any form of modification and/or copying. Source code refers to as a set of instructions written using human-readable computer language (usually text) such as Basic, C++, Java, etc. Source code is often transformed by a compiler program into low level machine code understood by computers. Computers understand the language of 1's and 0's (Binary Code) which might be a bit challenging for human beings to understand. Thus source code is the language that humans can understand and which is used by humans (programmers) to write instructions to be carried out by computers.

Open source software - software delivered with its source code - is an outcome of the convergence of Information and Communication Technology (Williams von Rooij, 2009). With free access to the source code, there are virtually no limits to what can be done to the software. Every user can edit the software to their own particular needs or requirements. This makes it possible to have so many different flavours of a particular software with different users or organizations adding or removing features as they see fit. While proprietary software can (and indeed must) be used "as is", open source software can be enhanced through the users' efforts which could lead to higher quality code (Lerner and Tirole, 2002)

Open source software and computing has been one of the hot topics in the field of computing. Open source software refers to software created by a community of programmers

rather than a single vendor (Blumenthal, 2005). A popular example would be the Firefox web browser whose source code was created by programmers from different organizations and is made freely available to anyone who wants to copy and modify as they see fit. Open source software and operating systems have proven so popular that many organizations are adapting them into their business models. Gallaway and Kinnear (2004) state that the tradition of sharing software, programming advice, and bits of code, coevolved with the spread of computers. In those early days of computers, computers were exotic, few could afford it and they were found only in universities, large corporations and government agencies. Thus, user groups sprang up to facilitate cooperation and prevent duplication of effort when programmers separated by geography and discipline encounter challenges that have already been overcome successfully by others. This sharing custom stems from the academic tradition of sharing and publishing research as well as the pragmatic drive to improve quality and reduce effort by seeking and offering help.

According to Lerner and Tirole (2002), the surge of interest in open source software development was spurred by:

- 1) The rapid diffusion of open source software
- 2) Significant capital investments in open source projects such as major corporations like HP and IBM that launched projects to develop and use open source software
- 3) The new organization structure – the collaborative nature of open source software development being hailed as an important organizational innovation
- 4) Widespread diffusion of the internet. Though there has always been the tradition of sharing and cooperation in software development, widespread diffusion of the internet has dramatically expanded the scale of this sharing and cooperation.

In tracing the history of open source software, three (3) distinct eras can be identified. The first takes place in the 1960's and 1970's when the fundamentals of computer operating systems and the internet were developed in academic settings such as Berkeley and MIT. During this period, sharing source code was common place among programmers. Software development was done on an informal basis and little effort was made to define property rights or restrict software reuse. This informality proved to be an issue when some developers (AT&T specifically) felt the need to enforce intellectual property rights to software (UNIX operating system) that a number of academics and corporate researchers had made contributions to.

In the second era (the 1980's), efforts were made to establish some ground rules on cooperative software development. Richard Stallman was instrumental in this movement to develop and disseminate a wide variety of software without cost. Stallman was motivated to establish the Free Software Foundation after he encountered difficulty with his new printer. Stallman wanted to modify the software of his new printer like he did to his previous printer for which he had access to the source code. He did not have access to the new printer's source code and when eventually he found a colleague that had it, it could not be shared because of a non-disclosure agreement. This angered Stallman and led to the development of the General Public License for a computer operating system called GNU (GNU's not UNIX). This General Public

License specified that software should be free to use, modify and redistribute. In exchange for being able to modify and distribute the GNU Software, developers had to agree to make the source code freely available to whomever the program was distributed; insist that others who used the source code agree to do likewise; and all enhancements to the code had to be licensed on the same terms.

During this period there were other projects like the Berkeley Software Distribution (BSD) which took alternative approaches to licensing. BSD, like the General Public License allows free copying and modification of source code. BSD differs from the General Public License in that it allows redistribution for a fee without making the source code freely available. The only caveat is that the original source must be acknowledged.

The third era, which covers the early 1990's to date, was heralded by the widespread diffusion of the internet which led to volume of contributions and the diversity of contributors expanding unprecedentedly and numerous open source projects emerged (e.g. Linux). Other alternatives to licensing emerged such as Open Source Definition, for example, which did not require that proprietary code compiled with open source software become open source as well.

From its modest beginnings in the early 1980s, open source software has emerged as a phenomenon that is transforming the culture and the information economy (Dorman, 2002). Different groups make their own case for or against open access software depending on the side of the divide on which they belong. The first group are die-hard disciples of open access software who have nothing but good to say about it. Individuals who subscribe to this school of thought favour the free flow of information and suggest that if technology is not used to foster free access to information, there is the potential risk of the creation of a society in which information will be controlled by a political and economic elite. The second group are those who see nothing but disaster going down the route of open access software. They favour information control as they are of the opinion that free flowing information discourages the economic incentive to produce useful information and society would not be secure as anyone could have access to information that could destroy it. In reality the truth is not so clear cut. Each individual or organization has to decide what is a perfect fit based on the specific conditions which obtain in their own immediate environment.

Whatever the case may be, whether for or against open source software, the fact remains that open source software is very much a part of human existence, libraries inclusive. Nowadays from many of our mobile devices that run on the android operating system, to computers, laptops and servers that run on the Linux operating system, to other software (Library Management Software inclusive) that are open access, it is clear that the open access software movement has invaded the realm of libraries just as it has invaded other spheres of human existence.

Dorman (2002) is of the opinion that open access software is at the centre of a great struggle over the control of information in modern society. Libraries and librarians have traditionally always been instrumental in information management and the rise of open access software has impacted greatly how libraries and librarians carry out their traditional functions of information management and dissemination. How librarians choose to respond to this open

access software movement will be a good indication of the future role libraries and librarians will play in providing information services in the years to come.

The open source software movement is no longer a temporary fad, but a very important ingredient to meet some cultural, ethical, political and economic needs. Thus this research was carried out to discover the level of familiarity of librarians with open access software, their present attitudes to open access software among other things.

## **LITERATURE REVIEW**

Open source software is software that is free and whose source code is freely available to any member of the public to modify as they deem fit and has become an important component of human existence. According to Pitegoff (2001), open source software differs from proprietary software in the manner in which it is distributed. Open source software is distributed freely with its source code which allows users to make changes to the software while proprietary software source code is kept secret and programmers writing proprietary software have to agree to maintain confidentiality of the code. Weber (2006) sees the innovation of open source being in its ability to inspire and finance software production not by holding code close to the corporate chest for competitive advantage but, rather, by releasing the code to the commons so as to take advantage of pooled resources, spur further innovation from wherever it may arise and produce a better tool by submitting it to endless real-life peer review.

## **PROS AND CONS OF OPEN SOURCE SOFTWARE**

In the early days of open source, the financial gain of participating in open source projects were not readily visible. In those days it was more an issue of prestige and peer recognition for having been a contributor to an open source project especially the big ones. But nowadays that is not the case. Open source has really come into its own especially in the smartphone market where we have Android being the market leader cornering more than 45% of the smartphone market. With the added revenue from application development and other sundry services, this makes participating in the Android Movement a very profitable venture to be involved in right now.

There are always pros and cons to be weighed in any situation. There are a group of people who are all for open access software. They look at open access software through rose coloured glasses and see no harm whatsoever in making use of it. There is another group who are dead set against open access software and there is no manner in which it can be presented that would convince them to take a crack at going down the open access route. The suitability or unsuitability of open access software depends to a large extent on which group one belongs to.

Clement, Hagenmaier and Knies (2013) are of the opinion that open source has the following advantages:

- i) Open source technology encourages building as the flexibility inherent to open source technology (Fedora, Android, etc.) means that multiple communities can use the base system for a variety of solutions in different institutional settings
- ii) The “public” element inherent to open source technologies means that scholars and libraries who use them and have questions or find bugs or use them in some innovative manner leave documentation that steers how these open source technologies are implemented and by whom
- iii) Open source software and standards are not only free but their robust user communities also make them common making more communities work to sustain their use
- iv) They are vetted by users who are knowledgeable and experienced who also publish and discuss their findings
- v) They are constantly in development and since no one must reinvent the wheel, the wheel becomes more refined

Because there is no license for the source code of open-source software some may assume that open-source software is less expensive to use than proprietary software. But zero license fees do not automatically translate into cost savings. There might be other costs (such as maintenance, support, among others) that might be incurred in using the software. Moore (2002) warned institutions that managing open source courseware and knowledgeware development as well as adjusting it to fit a particular institutional culture can be almost as labour intensive as and expensive as buying a proprietary product. Alterman (2004) stated that open-source is actually a marketing strategy by which vendors make money by selling support and other services to institutions adopting open source software.

Proprietary software manufacturers cannot anticipate everything and thus cannot offer every conceivable variation that consumers might desire. They cannot cover all bases. In using a software, all sorts of niggling issues might crop up which will be addressed by either releasing patches or updates depending on the magnitude of the issue. In proprietary software, users have no choice but to wait for the manufacturer to provide them with these security patches or updates as the case may be. But in the open access world this is not the case. If an issue crops up and the user has the expertise to solve the issue, the user can go right ahead and do so without waiting for the manufacturer. The user can take active steps to solve the issue and even go a step further and let others know what steps they have taken to solve the issue. If other users have not come up with a better solution to the problem, they have been saved the time and energy they would have expended in trying to solve the issue.

A number of authors (Pavlicek, 2000; Weber, 2004; William, 2002) contend that open-source software will provide both faculty members and the technical staff who support them with enough flexibility to maintain the correct balance between technology and pedagogy that would foster the construction of integrated learning environments that serve both the academic and administrative needs of institutions. In fact, many believers of the open source movement see it

as the epitome of technology for the common good, an appeal which resonates with education as such values are well entrenched and indeed form part of the mission of education, most especially higher education (Williams von Rooij, 2009). Some supporters of open source software believe it has the advantage of giving libraries access to active user communities (e.g. Fedora Commons, DSPACE Community, etc.) where fellow users from all over the world gather to create tools and standards as well as discuss issues concerning performance interoperability and sustainability. This worldwide phenomenon of open source has allowed for standardization without monopolization which, according to Farkas (2008) has led to greater software interoperability that has allowed libraries all sorts of freedoms.

For programmers, open source is absolutely delightful as they can easily showcase their skills and inventiveness. In open source projects, everyone can see the contributions of each individual programmer, how difficult that particular task was, how creative the programmer was in overcoming the said issue, etc. This not only gives them prestige, but could also bring more lucrative jobs and projects in the future.

There is no doubting the fact that open source software has a number of advantages, but at the same time, it does have a number of challenges. There is always a flipside. Proponents of open source software would like to gloss over these challenges while detractors of open source would be quick to pounce on such. Chief among these challenges is the potential for program splintering into various variants. Open source is by its very nature “open”, encouraging freedom of programmers to do and undo as they see fit. This is very evident in the present Android ecosystem where so many variants of the versions of the Android mobile operating system exist. Updates, patches, etc. of these different splinters of the operating system become quite a challenge to overcome.

Another challenge, is that open source software tend to be geared towards more sophisticated users and thus the average user tends to find himself at sea when trying to make use of such open source software. For example, a librarian that wants to create an institutional repository for his/her library cannot simply pick up an open source institutional repository software such as DSpace and install it. Such an individual would have to have some form of background in database management, scripting, programming, etc. before he/she can successfully install the software. So even after downloading the “free” software, one would require the services of an expert to install such a software and this would most likely come at a certain cost. An argument that most detractors of open source software put forward in such situations is that “is such software actually free?” The average user is not really interested in what is going on “under-the-hood” of the software. All they are interested in is whether it can serve a particular purpose either for personal or organizational use. It is sophisticated users that can tolerate the lack of easy-to-understand user interfaces in exchange for the ability to tinker with the source code.

When it comes to issues of security, there are differing points of view. First, there is the perception that when the when source code is open and freely visible, programmers can readily identify security flaws and other problems and have them fixed as soon as possible. On the other hand, it is suggested that the openness of the source code allows malicious hackers to figure out

and exploit these weaknesses. However, scholars such as Raymond (2001) state that security challenges are grounded in bad design rather than source code access. It is argued that security at any level is dependent on the human factor: the skill, knowledge, discipline and vigilance of developers and administrators in building and managing software. As a result, if software is not well grounded on the basic tenets of good and secure software design, it does not matter whether the source code is open to the public or not, such software would not be secure.

It must be recognized that open access software is not likely to supplant proprietary software at present or even at any time in the near future. There is a sort of symbiotic relationship going on between these two types such that in most organizations one usually sees a mix and match of both open access and proprietary software. This is a trend that is likely to continue for the time being and even years to come. According to Pitegoff (2001), open source is not about to destroy commercial software as they both peacefully coexist in many corporate computer systems. Companies that develop, sell and integrate software as well as companies that do not sell but desire to improve, enhance or modify software, can and will continue to use either proprietary or open access software when it gives them a competitive advantage. Ideally, a user should consider both open source and proprietary software for any given project and use the one that would do the job best.

### **OBJECTIVES OF THE STUDY**

This study therefore sets out to achieve the following objectives:

- 1) To find out if librarians are familiar with open source software
- 2) To find out what type of software librarians use
- 3) To find out the software preference librarians have and why
- 4) To find out what criteria librarians take into account when selecting software
- 5) To find out librarians' attitudes towards open source software

### **SCOPE OF THE STUDY**

The study is limited to the six (6) geopolitical zones of Nigeria. The targeted subjects of the study are librarians in both private and public higher institutions of learning.

### **SIGNIFICANCE OF THE STUDY**

Software are of significant importance in the day-to-day life of modern day man. As librarians are custodians of knowledge, it is important to understand what their attitudes are to this relatively new phenomenon called open access software in particular as it could possibly indicate the attitudes of librarians to new technologies and change.

When carried out the study would reveal librarians' attitude to open access software. It would also reveal whether they adopt open access software, why they adopt it if they do and reasons why they do not adopt it if they do not. It would also discover how they have been applying open access software if in use and also proffer probable solutions to stumbling blocks to making use of open access software.

## METHODOLOGY

The study covered a period of six (6) months from February to June 2015. The research instrument of the study was a questionnaire which was designed and administered to respondents to elicit information. Responses to this instrument were then analyzed using simple percentages and results of this process presented in tables.

The population of the study was made up of nine hundred and twenty (920) respondents which represents a ninety-two percent (92%) return rate of the one thousand questionnaires administered for the study. The questionnaire was administered to librarians in higher institutions of learning from the six (6) geopolitical zones of Nigeria.

## DATA ANALYSIS AND FINDINGS

### Biodata/Demographic Information

**Table 1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	540	58.7	58.7	58.7
Female	380	41.3	41.3	100.0
<b>Total</b>	<b>920</b>	<b>100</b>	<b>100</b>	

Gender wise, it was discovered that male respondents were more than female respondents with male respondents accounting for fifty eight point seven percent (58.7%) of the total respondents while females accounted for forty one point three percent (41.3%).

**Table 2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
20 – 30	44	4.8	4.8	4.8
31 – 40	380	41.3	41.3	46.1
41 – 50	286	31.1	31.1	77.2
51 – 60	183	19.9	19.9	97.1
61 and above	27	2.9	2.9	100
<b>Total</b>	<b>920</b>	<b>100</b>	<b>100</b>	

The age of respondents ranged from twenty (20) years old to sixty one (61) years old and above. The greatest number of respondents were within the 31 – 40 and 41 – 50 age bracket accounting for forty one point three percent (41.3%) and thirty one point one percent (31.1%) of the total number of respondents' respectively. This was followed by respondents in the 51 – 60 age bracket with nineteen point nine percent (19.9%) and those in the 20 – 30 age bracket with four point eight percent (4.8%). The age bracket of 61 and above had the fewest number of respondents, twenty seven (27) representing two point nine percent (2.9%) of the total number of respondents.

**Table 3: Qualification**

	Frequency	Percent	Valid Percent	Cumulative Percent
HND	40	4.4	4.6	4.6
BSc	60	6.5	6.8	11.4
MSc	600	65.2	68.2	79.6
PhD	80	8.7	9.1	88.7
Others	100	10.9	11.4	100.1
<b>Total</b>	<b>880</b>	<b>95.7</b>	<b>100.1</b>	
Missing System	40	4.4		
<b>Total</b>	<b>920</b>	<b>100.1</b>		

The lion share of respondents, six hundred (600) representing sixty eight point two percent (68.2%), had obtained a Master's degree. Those with Bachelor's degree and Higher National Diploma accounted for six point eight percent (6.8%) and four point six percent (4.6%)

respectively. Those with Doctorate degrees accounted for nine point one percent (9.1%) while those with other qualifications accounted for eleven point four percent (11.4%).

**Objective 1: Find out if librarians are familiar with open source software**

**Table 4: Familiarity with the term software, proprietary software and open source software**

Question	Are you familiar with the term software?		Are you familiar with the term proprietary software?		Are you familiar with the term open source software?	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	880	95.7	680	73.9	900	97.8
No	0	0	220	23.9	0	0
No response	40	4.3	20	2.2	20	2.2
<b>Total</b>	<b>920</b>	<b>100</b>	<b>920</b>	<b>100</b>	<b>920</b>	<b>100</b>

The table above clearly show that the respondents are familiar with the terms software, proprietary software and open source software. Table 4 shows that ninety five point seven percent (95.7%) are familiar with the term software while forty (40) respondents representing four point three percent (4.3%) had no response at all. The table also indicated that seventy three point nine percent (73.9%) of respondents responded in the affirmative to the question whether they are familiar with proprietary software while twenty three point nine percent (23.9%) and two point two percent (2.2%) responded in the negative and had no response respectively. In the table we also see that ninety seven point eight percent (97.8%) are familiar with the term open source software while two point two percent (2.2%) have no response to the question.

**Objective 2: Find out what type of software librarians use**

**Table 5: Do Librarians use software**

Question	Response	Frequency	Percentage
Do you ever use any software?	Yes	880	95.7
	No Response	40	4.3
	No	0	0
	<b>Total</b>	<b>920</b>	<b>100</b>

The table above shows quite clearly that practically all the respondents use software in one form or the other. Ninety five point seven percent (95.7%) responded in the affirmative when asked whether they use any software while four point three percent had no response to give at all (4.3%).

**Table 6: What type of software Librarians use**

Question	Response	Frequency	Percentage
What type of software do you use?	Proprietary	140	15.2
	Open Source	320	34.8
	Both	320	34.8
	No Response	140	15.2
	<b>Total</b>	<b>920</b>	<b>100</b>

When it comes to the type of software used by librarians', from Table 6 above, thirty four point eight percent (34.8%) indicated that they use a combination of both proprietary and open source software, the same figure returned by respondents that use open source only. One hundred and forty (140) respondents representing fifteen point two percent (15.2%) indicated that they used proprietary software, the same as the respondents that had no response.

**Table 7: What mobile operating system are Librarians familiar with**

Question	Response	Frequency	Percentage
Which mobile operating system have you ever used?	Android	680	46.6
	iOS	160	11
	Blackberry	260	17.8
	Windows Phone	280	19.2
	Others	80	5.5
	<b>Total</b>	<b>1460</b>	<b>100.1</b>

Table 7 shows that Android is the most popular mobile operating system as it accounts for forty six point six percent (46.6%) of the respondents. This was followed by Windows Phone, Blackberry and iOS which accounts for nineteen point two percent (19.2%), seventeen point eight percent (17.8%) and eleven percent (11%) respectively. Other mobile operating systems bring up the rear with five point five percent (5.5%) of the total respondents.

**Table 8: What desktop operating system are Librarians familiar with**

Question	Response	Frequency	Percentage
Which operating system have you ever used?	Windows	880	67.7
	Linux	300	23.1
	Apple OS	80	6.2
	No Response	40	3.1
	<b>Total</b>	<b>1300</b>	<b>100.1</b>

When it comes to desktop operating systems, Windows has the highest number of users, eight hundred and eighty (880) which represents sixty seven point seven percent (67.7%). Linux is next with twenty three point one percent (23.1%) of the respondents followed by Apple which accounts for six point two percent (6.2%). Some respondents, forty (40), had no response to give and this accounted for three point one percent (3.1%).

**Table 9: Integrated Library Management Software (ILMS) used by Librarians**

Question	Response	Frequency	Percentage
What Integrated Library Management Software (ILMS) are you using?	SLAM	100	10.9
	VTLS	20	2.2
	Virtua	140	15.2
	Papyrus	20	2.2
	KOHA	240	26.1
	NewGenLib	20	2.2
	Millenium	20	2.2
	Liberty	20	2.2
	AgriOcean	20	2.2
	No Response	320	34.8
	<b>Total</b>	<b>920</b>	<b>100.2</b>

Three hundred and twenty (320) respondents did not respond to the question while two hundred and forty (240) representing twenty six point one percent (26.1%) indicated the ILMS used is KOHA. Virtua and Slam account for fifteen point two percent (15.2%) and ten point nine percent (10.9%) respectively. VTLS, Papyrus, NewGenLib, Millenium, Liberty and AgriOcean all account for two point two percent (2.2%).

### Objective 3: Find out software preferences librarians have and why

**Table 10: Which mobile operating system do Librarians' prefer**

Question	Response	Frequency	Percentage
Which mobile operating system do you prefer?	Blackberry	160	17.4
	Android	540	58.7
	iOS	0	0
	Windows	140	15.2
	Others	80	8.7
	<b>Total</b>	<b>920</b>	<b>100</b>

From Table 10, Android is the most popular mobile operating system as five hundred and forty (540) respondents indicated that it is their mobile operating system of choice. A distant second is Blackberry which accounts for one hundred and sixty (160) of the total respondents. Windows is in third place with one hundred and forty (140) respondents. Eighty respondents (80) chose Others while no one made use of any mobile phone running the iOS mobile operating system.

**Table 11: Reasons for Mobile OS preference**

Question	Response	Frequency	Percentage
Why do you prefer the mobile OS chosen?	Documentation	140	5.8
	Budgetary constraints	80	3.3
	Popularity	260	10.8
	Recommendation of colleagues/peers	180	7.5
	Ease of use	800	33.3
	Cost	180	7.5
	Low data consumption	20	0.8
	Security	340	14.2
	Support	300	12.5
	No response	100	4.2
<b>Total</b>	<b>2400</b>	<b>100</b>	

When questioned about their reasons for preferring one mobile operating system over another, as seen in Table 11, it was discovered that ease of use was the most common reason having thirty three point three percent (33.3%) of the total respondents. This was followed by security and support with fourteen point two percent (14.2%) and twelve point five percent (12.5%) respectively. Ten point eight percent (10.8%) indicated that popularity was their reason for choosing a mobile OS while seven point five percent (7.5%) picked both recommendation of colleagues/peers and cost as their reason. Five point eight percent (5.8%) picked documentation while three point three percent (3.3%) indicated budgetary constraints as the reason for picking a mobile operating system and zero point eight percent (0.8%) indicated low data consumption was their reason for choosing a mobile operating system. Four point two percent (4.2%) of the respondents did not have a response to give.

**Table 12: Which desktop operating system do Librarians' prefer**

Question	Response	Frequency	Percentage
Which operating system do you prefer?	Windows	680	73.9
	Linux	200	21.7
	Mac	0	0
	No Response	40	4.4
	<b>Total</b>	<b>920</b>	<b>100</b>

Table 12 shows that the greater number of Nigerian Librarians are using Windows OS, seventy three point nine percent (73.9%), while twenty one point seven percent (21.7%) are using Linux operating system. Four point four percent (4.4%) had no response at all and no one made use of desktop computers running a Mac OS.

**Table 13: Reasons for Desktop OS Preference**

Question	Response	Frequency	Percentage
Why do you prefer the chosen desktop OS?	Budgetary constraints	40	1.9
	Cost	160	7.5
	Security	280	13.1
	Documentation	200	9.3
	Ease of use	660	30.8
	Recommendation of colleagues	80	3.7
	Popularity	340	15.9
	Support	340	15.9
	No response	40	1.9
	<b>Total</b>		<b>2140</b>

In Table 13, we see that ease of use takes the lion share with thirty point eight percent (30.8%) followed by popularity and support which both accounted for fifteen point nine percent (15.9%) of the total respondents. Thirteen point one percent (13.1%) of the total respondents were particular about security while nine point three percent (9.3%) indicated documentation as their reason for choosing a particular desktop operating system. This was followed by recommendations of colleagues with three point seven percent (3.7%) and budgetary constraints with one point nine percent (1.9%) which was the same for respondents that had no response.

**Table 14: Reasons for choice of Integrated Library Management Software**

Question	Response	Frequency	Percentage
What were the reasons for your choice of Integrated Library Management Software?	Cost	300	12.6
	Recommendations of colleagues	220	9.2
	Support	380	16
	Ease of use	520	21.8
	Documentation	200	8.4
	Security	200	8.4
	Web-based	20	0.8
	Popularity	200	8.4
	Budgetary constraints	140	5.9
	No response	200	8.4
	<b>Total</b>	<b>2380</b>	<b>100</b>

When it comes to reasons for choosing a particular Integrated Library Management Software, ease of use was the most popular reason with 21.8% of the total respondents while support was second with 16%. Cost accounted for 12.6% while recommendations of colleagues accounted for 9.2%. This was followed by documentation, security, popularity and no response all of which had 8.4%. Budgetary constraints accounted for 5.9% of the total respondents while web based accounted for only 0.8%. Respondents with no response took 8.4%.

**Objective 4: Find out what criteria Librarians' take into account when selecting software**

**Table 15: What are the major considerations of Librarians' when selecting a software?**

Question	Response	Frequency	Percentage
What are your major considerations when selecting a software?	Cost	540	16.7
	Support	520	16.1
	Ease of use	820	25.3
	Recommendations of colleagues	180	5.6
	Security	340	10.5
	Documentation	220	6.8
	Budgetary constraints	280	8.6
	Popularity	340	10.5
<b>Total</b>		<b>3240</b>	<b>100.1</b>

Table 15 shows that the most popular consideration in software selection is ease of use with 25.3% of respondents chose. This was followed by cost and support with 16.7% and 16.1% respectively. Security and popularity both account for 10.5% of respondents while budgetary constraints accounts for 8.6% of total respondents. Budgetary constraints is responsible for 8.6% while recommendations of colleagues is the least favoured with 5.6% of the total respondents.

**Objective 5: To find out Librarians' attitudes to Open Access Software**

**Table 16: Librarians' attitudes to open access software**

Question	Response	Frequency	Percentage
How do you feel about the principles of Open source?	Strongly in favour	600	65.2
	Mildly in favour	260	28.3
	Not in favour	60	6.5
	<b>Total</b>		<b>920</b>

Table 16 shows Librarians' attitudes to open access software and it indicates that 65.2% of librarians are strongly in favour of open access software. On the other hand, 28.3% are mildly in favour while 6.5% are not in favour of open access software.

## **DISCUSSION OF FINDINGS**

The study reveals that Nigerian librarians are familiar with software (both proprietary and open source software). They also make use of open access and proprietary software in their day to day lives. This agrees with the position of Pitegoff (2001) that both open access and commercial software peacefully coexist in many organizations' computer systems. For desktop computers, proprietary software (Windows) was the most popular while for smartphones, the most popular is open access (Android). Quite a number of libraries are automated with both proprietary and open access software.

For mobile devices, librarians preferred Android and according to the respondents, the primary reason for this being its ease of use. Other reasons given for selecting Android as the mobile software of choice include security, support, popularity and recommendations of others. For desktop computers, Windows was the most preferred by respondents and ease of use was the most popular reason for choosing Windows. The study also discovered that when choosing a Library Management Software, Librarians think of ease of use, support, cost, recommendations of colleagues, documentation, security, among others. Just like with mobile devices and desktop computers, ease of use is the most popular reason for selecting a LMS. Ease of use being the primary reason for selecting software, most especially for mobile devices where Android is the most popular, contradicts the position of Dorman (2002) that highlights freedom as one of the principal advantages for using Open source software and Kumar and Abraham (2009) that highlight economic feasibility as the main reason for utilizing open source software.

The study also showed that majority of librarians are strongly in favor of open access software.

## **CONCLUSION AND RECOMMENDATIONS**

It is good to know that Nigerian Librarians are aware of Open Access software an indication that they are somewhat aware of trending issues and developments in their area of expertise. Based on the findings of this research, the following recommendations are made:

- 1) Libraries should embrace networking and exchange programmes. This would facilitate sharing and spreading of knowledge as they would be able to share amongst themselves new and innovative ways that sister institutions all over the world are making use of open source software.
- 2) Each library has certain characteristics which are peculiar to it alone, thus librarians should take this into consideration when applying any innovation in their institution. Because it worked somewhere else does not mean it would be a perfect fit in your institution. Do not be rigid. In all likelihood the innovation would have to be adapted to suit the peculiarities of the environment in which one finds oneself.
- 3) Technology in today's world is constantly changing and librarians have to equip themselves to deal with this change. Thus continuing education and professional

development should be taken very seriously by libraries and librarians so that skills can be acquired that would make them relevant and better able to serve their users.

- 4) Librarians should beware of TECHNOPHOBIA – technology for the sake of technology. Not every technology/software should be applied as not every technology would result in benefits. Also not every technology/software should be applied from the get go as there would probably be some bugs and other teething problems. Application should wait till some sort of stability has been achieved.

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