

Open-Source Software and Their Impact on Digital Library and Information Centre in Nigeria

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Abstract- *The present era of information explosion and technological advancement moving from the information age, knowledge society and wisdom implementation. Institutions of knowledge have many tasks to face, where the entire system of the library/information Centre is now gradually changing from manual operation to digital, automated knowledge or data bank. The objective of the paper was on features and advantages of free-source library/information Centre automation software, the criteria for selecting the right free-source library/information Centre automation software and limitations of the software. The study adopted literature review research. The use of free-source library/information Centre automation software will be a way forward to limit the cost of academic digital libraries and information Centre operations. Some of the free-source library/information Centre automation software discussed in this paper include: D-Space, Greenstone, E-Prints, OpenBiblio, KOHA, NewGenlib and PhpMyLibrary, thus, are for developing digital library institutional repositories or library/information Centre automation systems. The findings from the study were that open software has transformed the field of libraries and information Centre from manual to automated base and also information professionals need to learn the open software system and rights to avoid damage to the source code or loss of data which will help in facing the problem posed by commercial software. The study recommended the use of open-source software considering it potentially benefits cost reduction, gives customers more control over the system and increases open-source code development with significant advancement for effectiveness in the service delivery.*

Keywords: *Academic Libraries; Information Centre; Open-Source Library Automation Software*

I. INTRODUCTION

Academic libraries are institutions of knowledge found in mono-technics, polytechnics, colleges of education and Universities in Nigeria, academic libraries are knowledge banks, found attached to

institutions providing needed information resources to its users, academic library collection or services are to support learning, teaching and research activities of their parent institutions (Yacom. 2011).

In the same vein, information Centre provide research and development material or information resources to an organization attached to it, they select, acquire, store, and retrieve information in response to the information request.

With the rapid growth in technological innovation, building and implementation of digital libraries, is a challenge in many developing countries including Nigeria, considering the systems and speed rate of the Internet and lack of adequate funding, which prompt a concern.

Ayo (2001) stated that most university libraries in Nigeria are yet to fully implement information technology gadgets because of paucity of funds, erratic power supply, and lack of qualified personnel to drive the tool, Omeluzor and Oyovwe-Tinuoye (2016) also stated that some academic libraries are yet to fully implement automation software to manage their library services due to insufficient funding.

Funding is integral for the acquisition, maintenance and use of integrated library software and digital facilities in the library and information Centre.

The present age has advanced in software and utility development, many software has been built to cater needs of users worldwide, but the higher cost of such gadgets prevents many libraries and information Centre from getting access to them.

To resolve this challenge, to the advantage of research scholars and clientele, Individuals, groups, organizations and communities of libraries and information Centre have developed free source codes, which are designed, redesigned and distributed with less cost, known as open or free-source software.

The software is available online and can be downloaded, built, installed/run, distributed or shared, designed and redesigned among the customers (Rosa and Lamas, 2007).

Open/free-source code software is systems software in which source codes (programs) are available on an open license with the public or private server that permits the customer to conceive, redesign, and improve the source code, distribute it to various mediums or forms and most of the development are in the public or collaborative patent.

In the present era, digitalized libraries/information centres collections are moved from client servers/databases as well as resources available in electronic formats to a platform or web base system, to handle different types of digital resources, libraries and information Centre need high-performance software, with cutting edge access and retrieval tools such include open/free-source automation source codes considering less cost of its implementation.

II. OBJECTIVES

The objectives of this study focus on:

- i. free-source library/information Centre's automation software and their features
- ii. criteria for selecting the right free-source automation software,
- iii. advantages of free-source library/information Centre's automation software
- iv. limitations of free-source library/information Centre's automation software

III. METHOD

The research methodology adopted for the research was literature review research. Literature review research methodology can broadly be described as a more or less systematic way of collecting, synthesizing previous research and identifying

knowledge gaps within the literature (Tranfield, et al, 2003).

An effective and well-conducted review as a research method creates a firm foundation for advancing knowledge and facilitating theory development, integrating findings and perspectives from many empirical findings and can address research questions with a power that no single study has (Webster and Watson, 2002).

The literature was explored by conducting research in library databases, catalogues, related books and web searches in search engines or platforms, wholesome journals in online and offline databases especially in the field of Library, Science and technology such as Library Trend, Library and Information Science and Library Technology Abstract, and International Journal of Library and Information Science and Technology, provided knowledge on the concept of open source library automation software, were however are of general nature they did not accurately capture the specific issues on features, criteria of selecting and limitation of open-source software in Academic libraries and information Centre.

To accurately capture the real issues at hand, a literature research method approach was adopted, with findings from various literature on open-source software and their use in the library and information Centre. This method proved to be effective as it provided the needed ground to conduct this research.

IV. OPEN/FREE SOURCE SOFTWARE

Free/Open-source library/information Centre's automation source code is system software whose source code is for the public use, copied, redesigned and distributed with no cost and no developers can claim any ownership of the distribution, open/free source codes promote software collaboration, quality and reliability by encouraging independent peer review and rapid evolution of the software "program" (Kamble, 2012).

V. OPEN-SOURCE SOFTWARE IN LIBRARIES AND INFORMATION CENTRE

The new technological innovation has brought the emergence of free/open-source software for libraries and information Centre as a more available way/option for cooperation and automation in libraries and information Centre.

For information professionals, automation and collaboration are the main focuses on open access, standards and archive initiatives to help one another in building resources and implementation of a technological gadget among others, for effective service delivery, this character and prevalent in an evitable economy stand have encouraged the development of open/free-source software (Seeran, 2011).

Below is a diagram showing some open-source software in the library and Information Centre

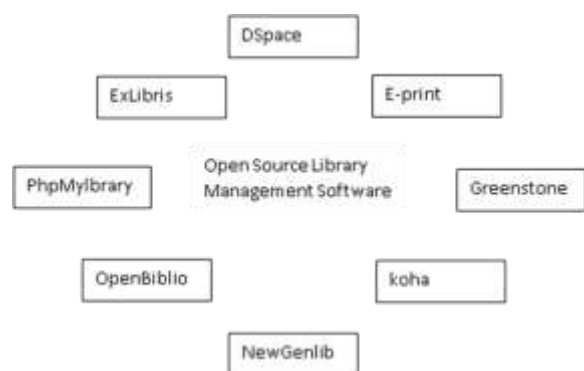


Figure 1 The research schema, self-constructed

VI. OPEN-SOURCE SOFTWARE HISTORY

Free/Open-source software: communities or groups of people are important types of any virtual groups or community, where the groups meet online or physically with a focus on developing open/free-source code software standard, durable and reliable for both the developers and the general public using the source code.

Richard Stallman initiated the Free Software Foundation (FSF) in 1985, to identify and diffuse the

right mechanisms and conceptual ideology of what he defined as “free software” (West and Dedrick, 2001).

By putting the GNU Manifesto he extended his principal view of the term legal right for the source code which gave room for groups of developers to join him in his GNU Project (GNU stands for “GNU’s not UNIX”).

In 1989, the basis released the GNU General Public License (GPL) version 1, while the updated version 2 was released in 1991 which legalizes "copyleft" mechanisms and grants end-user freedoms in software redesign, distribution, redistributing the source code or software.

Free/Open-source software allows making an upgrade or customised version of the software and built or installed to any processor architecture of a choice and can be shared with others or made available for the groups or community in need of the software.

Free/Open-source software grants legal rights to clientele which would otherwise be prohibited by copyright. These include rights on customization, upgrade, design, usage and redistribution.

Many free-source code rights have qualified in the context of the open-source movement. The most prominent example is the popular general public legal right. Open-source code software gives ways for public accessibility, the free-source legal right allows the developers to make adjustments or drive optimal measures to such access.

The “open source” label came into view at the session held in Palo Alto an idea evoked by Netscape's January 1998 broadcasting of a source code release for Navigator (as Mozilla). A group of people at the session included John Hall, Sam Ockman, Larry Augustin, Christine Peterson, Todd Anderson, and Eric S. Raymond. Used the stand before the release of the navigator's source codes to clarify ambiguity and confusion caused by the word “free” in English.

The open-source initiative is generally thought to have begun with this session's ideas. But some people

still claim that the birth of the Internet, in 1969, started the open-source development and challenge.

VII. OPEN-SOURCE SOFTWARE AND THEIR FEATURES

i. D-Space open-source library/information Centre's automation software and features

D-Space is free/open-source software of choice for academic libraries and information Centre, non-profit, and non-commercial, for developing open digital or institutional repositories. It is open and easy to run, customize, design and redesign "out of the box" considering the needs of the institution.

D-Space stores, manages, preserves and enables easy access and retrieval of the digital content including images, moving images, text, mpegs and data sets, with ever-growing groups of developers, committed to continuously upgrading and improvement of the software. The features include:

- It is mostly used for the repository/database of institutional libraries or information centres.
- The software is reliable, flexible, lean and agile
- Easy and simple to develop, run and customize. A code or set of functional source code that can be upgraded to or integrated with web services and tools in the larger ecosystem. (www.duraspace.org/dspace/about/)

ii. E-prints open-source library/information Centre's automation software and features

E-Prints free/open-source software: The initial free/open-source repository software developed was e-print, which now lies at the heart of research, education, corporate and institution digital repositories in so many countries around the world.

E-prints as the institutional repository is an information data bank designed to house research outputs, provide access, re-usable, and preserve the information material for future use and reference. E-prints are capable of controlling all digital objects, ranging from portable document format (PDF) to data sets. Some features include:

- High-performance repository platform/database with high visibility, and quality in institutional open-access collections
- Less time consuming
- Provide meta-search of data/services from other repositories
- Enable user interface and easy-to-operate
- Strong handle/managed quality-controlled data or code framework (www.titanpad.com/eifl-foss-eprints)

iii. Greenstone open-source library/information Centre's automation software and features

Greenstone is free/open-source software for creating, developing distributing and re-distribution of institutional repositories for digitised or electronic collections of a library or information Centre.

It incorporates a system of organizing digital information publication using the internet or on a client-server. Greenstone was developed by the New Zealand library automation project at the University of Waikato in the early 2000s which provides a source code for library automation and cooperation within digital libraries.

The development and distribution were extended with groups of Info-nongovernmental institutions. It is free/open-source, multilingual software, right under the condition of the general public license. The free/open-source software runs under UNIX and Windows as it provides easy use where users can create files or use files of a choice or formats. The features include:

- Define the data or data set.
- Controlled the content.
- Manage the collection.
- Create access, store and retrieve of the collection
- Managing the full-text indexes
- Document text, and metadata search (Appelbe, 2003).

iv. Koha's an open-source library/information Centre's automation software and features

Koha is one of the most known free/open-source code systems software for library/information Centre automation, designed to: capture, store and index, preserve, catalogue, classify and enable access,

cooperation/collaboration of the research output of universities and information Centre in digital formats with full features free/open-source of library and information Centre automation software.

It's developed using open-source code standards with OPAC interface (open public access catalogue). Many smaller libraries or information Centre cannot afford to purchase or maintain commercial software, but Koha as open-source software may be the perfect alternative. With Koha vendors provide access, as such libraries or information Centre can receive technological support from any party of choice. The features include:

- The open-source code provides full navigation to its users.
- It supports different/multiple file formats.
- Embedded with a powerful search method.
- OPAC Interface
- Self-checkout interfaces.
- Multiple authentications for remote data set access.
- Ability to import badges from the catalogue with a single click. (Bailey et al, 2006).

v. NewGenLib open-source library/information centre's automation software and features.

NewGenLib (New Generation Library) it's a free/open-source library automation software for keeping the users at the Centre in digital library operations. The software is scalable, very efficient/effective and easy to manage.

NewGenLib as library/information Centre's management/automation software was developed by Versus Solutions Pvt., Ltd., in Hyderabad India. The source code was declared free software under a general public license (GPL).

The features are as follows

- Scalable, manageable and efficient
- Multilanguage support
- Support data entry, storage, access and retrieval of information content
- Embedded with user interface and multiple security levels support
- enable digital content attachments to metadata search

- RFID integration
- Circulation management (Kumar, 2010)

vi. OpenBiblio open-source library/information centre automation software and features

OpenBiblio is an open-source automation library software, available as free/open and easy-to-use software in an open-source technology.

The source code is used for the library and information Centre automation system to manage the routine services and resources.

The features of OpenBiblio include:

- Institutional data set or research output repository
- Easy to use and also embedded with OPAC interface
- Unit or individual account creation and bookings
- MARC Import / Export
- Use author, title, subject, search Interface
- Library circulation service module
- Ability to view and edit Bibliography content
- A feature to print a catalogue of information material
- School calendar features (Kamble. 2012)

vii. PhpMyLibrary open-source library/information centre's automation software and features

PhpMyLibrary is free/open-source code for automating library/information Centre's routine work the program was developed using PHP and MySQL platforms.

This system software comprises well-designed modules such as cataloguing (with features of adding, editing, searching and deleting library content) and a circulation interface module in which any clientele can access and search the catalogue content remotely.

It supports import from the ISIS database with an ISIS2MARC program. Widely used by information Centre and libraries as a multi-function automation base system. The features include:

- Easy to manipulate and configure.
- OPAC feature
- Serials automation system

- Feature to import the complete bibliography content
- Embedded with powerful analysis tools
- The system works with the UNIMARC format (Sophia J. 2019).

VIII. CRITERIA OF SELECTING LIBRARY AND INFORMATION CENTRE FREE/OPEN CODE AUTOMATION SOFTWARE

Evaluation of the library/information Centre's free/open-source code automation software is not a simple task, sometimes librarians or information officers are to use either costly software or a maximized number of usages of the renowned software in the libraries or information Centre.

There are many library/information Centre automation software which vary with capabilities/functions being used by several libraries and information Centre. Information professionals must have a comprehensive knowledge of the software before deciding on what to use (Kumar, 2010).

To select the library/information Centre's automation software, the process may contain the below outline point, which if used might guide the information professionals in selecting the needed software for efficiency and effectiveness of service delivery:

- Know the system requirement of the library or information Centre to be automated
- The capability of the software to be used considering the product quality reliability.
- The features and interface functions of the software
- Staffing requirement
- Operating system to be used
- Hardware requirements
- The additional need for the existing system requirement
- Navigation, error detection and customization
- Flexibility, multifunction and enhanced productivity.
- Meeting the working standards on MARC, Z39.50 or ISO

- Enable the use of both client-server LAN and web browsing architecture
- Enable users' interface
- Feedback
- Security levels
- Migration of data or data transfer from one repository to another.

IX. ADVANTAGES OF OPEN-SOURCE LIBRARY/INFORMATION CENTRE AUTOMATION SOFTWARE

The use is to manage an information Centre or academic library. A good library automation software proves to be a worthy investment, the software overall, helps in simplifying the entire library and information Centre's operation such as.

- Low hardware costs:** In general, open-source provides the standard, compact and reliable solution, its function requires less operating system power to complete the same tasks as on commercial software or workstations. The result is what you can get with less expensive or with the older hardware.
- Low software costs:** Free/open-source software solutions require no commercial legal rights or fees. The ideological extension is no maintenance fees. The cost may be for support or media documentation, if required in the library or information Centre.
- Scaling/consolidation potential:** In the same vein, free/open-source systems software often scale considerably multiple tasking for load equality, clustering, and open-source code system software, such as databases or platforms has allowed libraries and information Centre to scale up for a new upgrade to consolidate on more with less effort or cost.
- Support:** open-source software, provides support to superior customer solutions with free/open-source software supports are available and accessible online, many institutions of knowledge now use open-source software at less cost online. For example, Liblime and ExLibris cloud computing services.

v. Escape vendor lock-in: Free/open-source software exists in the declaration of freedom of choice, choosing what is best for the system operation in libraries or information centre.

vi. Quality software: So many witnesses and research reveal that open-source automation software is good and reliable software to use. The research and community standards, with the nature that the software is out there for the world to use, tend to drive workable design, customization and effectiveness in coding.

vii. Simplified right management: Once software is installed, built, and customised as many times in many locations based on needs, there's no need to count, track, or monitor the right compliance which includes the following: Automate the library/information Centre, less cost, reduce errors, and supports the continuity and visibility of the services, support growth and innovation.

X. LIMITATIONS TO FREE/OPEN-SOURCE LIBRARY AND INFORMATION CENTRE AUTOMATION SOFTWARE

In case of any upgrade/change in the operating system software, the library or information Centre may need support, in a case where there is no expert to solve the problem in the institution or an organization.

Free/open-source programs require technological skills for operation and maintenance, between the software developers and end users the definition may be fuzzy, (Carillo and Okoli, 2005).

Under the operating system software umbrella, the code builders and the customers belong to the same unit/entity where most of the source code depends on the user's input to change or upgrade the software.

In most cases, commercial product software will immediately respond to the user's feedback for any challenge with the source code, but for free/open-source code, one has to provide the solution or be at the chance of disjoining a community of developers.

XI. THE COMPARISON OF THE FEATURES AND LIMITATION OF SOME OPEN-SOURCE SOFTWARE DISCUSSED ABOVE

Table 1

Open-source software	Feature	Limitation
D-Space	It is mostly used for the repository/database of institutional libraries or information Centres.	it primarily provides only flat metadata schemas in the form key: value
Greenstone	Defining the data or data set	poor user interface and lack of scalability and extensibility
OpenBiblio	Research output repository and Library circulation service module	has limited documentation on the Internet that makes it difficult for new beginners to install and configure it
Koha	OPAC (online public access catalogue) interface	integration with other systems, such as discovery layers or digital content management platforms
NewGenlib	Embedded with user interface and multiple security levels support	Difficulties in debugging and keeping backups

XII. FINDINGS AND RECOMMENDATION

The information professional needs to learn the open-source software system and right to avoid damage to the source code or loss of data which will help in facing the problem posed by commercial software.

The free/open-source software increases the automation and control of data or information collection for libraries and information Centre providing the needed solutions.

No doubt open-source software has transformed the field of libraries and information Centre, from manual to automated base considering free or open-source benefits.

Potentially benefits to free/open-source software are to reduce costs give customers more control over the system and increase open-source code development with significant advancement, (Courant and Griffiths, 2006).

CONCLUSION

This paper concluded that the emergence and the need for open-source code has brought changes to the technological movement of the computing landscape, affecting the change in various institutions or organizations including libraries and information Centre.

The advancement and expansion in the use of open-source software create ways for library/information Centre's routine service automation, for effective service delivery, with less cost to implement a big project.

The paper also concludes that information professionals are taking advantage of open-source software as a way of averting the cost of paying to use software for libraries or information Centre. With free/open-source software, information professionals can improve and promote their services with numerous impacts and useful features for the effectiveness of their service to users.

REFERENCES

- [1] Appelbe B. The future of Open-Source Software. J Res Pract InfTech 2003.
- [2] Ayo, T. A. (2001). Information and communication technologies and the information professionals in the information age: The Nigerian perspectives. Information Management.
- [3] Bailey. Charles W., Jr. (2006). Open Access and Libraries.
- [4] Carillo, K.D. and Okoli, (2005) C. Open-Source Software Communities, in Subhasish Dasgupta, ed., Encyclopedia of Virtual Communities and Technologies, George Washington University.
- [5] Courant, P N. and Griffiths, R. J. (2006). Software and collaboration in higher education: A study of Open Source software. duraspace.org/dspace/about/
- [6] Kamble VT (2012). Open-source library management and Digital library software. DESIDOC 1. Lib. Inform.
- [7] Kumar KT Santhosh (2010). Open-Source Software for Libraries. Fifty-Fifth I LA National Conference on Library and Information Science in the Digital Era.
- [8] Omeluzor, S. U. and Oyovwe-Tinuoye, G. O. (2016). Assessing the adoption and use of integrated library systems (ILS) for library service provision in academic libraries in Edo and Delta states, Nigeria. Library Review 65(8/9)578-592.
- [9] Rosa, I. B. and Lamas, D. (2007). Digital libraries for developing countries. Proceedings of the IADIS International Conference on e-Society
- [10] Seeran A (2011). Development of FOSS (Free Open-Source Software) for Libraries. PEARL - A 1. Lib. Inform. Sci.
- [11] Sophia Jayden (2019). Best-free-open-source-library-management-software solutions
- [12] Titanpad.com/eifl-foss-e-prints
- [13] Tranfield, D., Denyer, D., and Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge

using systematic review. British Journal of Management.

- [14] Webster, J., and Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *Management Information Systems Quarterly*,
- [15] West, I. and Dedrick, J., (2001). Proprietary vs. open standards in the network era: an examination of the Linux phenomenon, in *Proceedings of Island of Maui, Hawaii*. IEEE Computer Society.
- [16] Yacom. H. (2011). Factors Affecting Information and Communication Technologies (ICTs) Use by Academic Librarians in Southwestern Nigeria; *Library Philosophy and Practice*.