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Challenges to the Implementation of Open Source Integrated Library Management Software in Academic Libraries: A Case of Kano University of Science and Technology Library

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CHALLENGES TO THE IMPLEMENTATION OF OPEN SOURCE INTEGRATED LIBRARY MANAGEMENT SOFTWARE IN ACADEMIC LIBRARIES: A CASE OF KANO UNIVERSITY OF SCIENCE AND TECHNOLOGY LIBRARY.

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Abstract

The paper examines the challenges in the implementation of Open source library management software in academic libraries in Nigeria using the experience of Kano University of Science and Technology, Library. The case study provides an account of the level of implementation of the NewGenLib library management software, which the library has adopted in the operations of the library, the challenges to the effective implementation of the software in the library as well as the strategies for the effective implementation of the software in the library. Qualitative data was gathered from structured interviews with the University Librarian as well as the heads of departments of the library. Findings reveal that the need for effective and adequate dissemination of information to the library users; the desire to ease the work of the library staff and the desire to allow users gain easy access to information material, pushed the library to adopt newer technologies in order to accommodate growing patron demands. Presently the software has only been implemented in the cataloguing and classification operations of the library. The challenges affecting the implementation of the software in the library include lack of funds, technical expertise, power failure and poor ICT infrastructure. Proper planning, prior feasibility studies, training of staff are recommended for any library planning to adopt and implement any ILMS successfully.

Key words*: Library Automation; ILMS; ICT; Open Source Software; Newgen Lib*

Introduction

The developments in information industry have affected the way libraries perform their services. Information Technology (IT) is a very vital tool in performing library operations. The relevance of the application of information and communication technology in library activities such as acquisition, cataloguing, circulation, serials management, etc., is no longer debatable as libraries globally have realized the need to move from their isolated past into integrated systems and networked operations. Recent developments in information handling processes have also obligated libraries to embrace automation as a means of enhancing their service delivery to their clientele.

Most organizations now develop information systems to enhance their services. Recently, libraries have sought to increasingly implement software solutions that involved distributed networking and access to remote information resources through the deployment of various library information systems. An Information System (IS) is generally considered to be a set of interrelated components that collect, manipulate and disseminate data and information which equally provide a feedback mechanism to meet an objective (Sadeh &Ellingsen,2005). The increased quality of new information systems with their benefits is major factors that explain their massive use in almost every type of organization including libraries.

The application of information systems in libraries has been a subject of interest to libraries and professional librarians for more than sixty-five (65) years (Rochtanek & Matthews, 2002). The size, growth rate of information and the complexities involved in updating manually based systems makes it difficult to provide effective library services in modern times. Librarians are then challenged to create and adopt "information systems for the collection, organisation, dissemination and preservation of information and new knowledge regardless of format" (Gbaje,2007). Library Management Systems Software are therefore developed today to support effective management of the library activities like stock taking, selection, acquisition, cataloguing and classification, serial management, evaluation and among others. LMS is an enterprise resource planning system for a library, which is used to track items owned, orders made, bills paid and patrons who have borrowed (Randhawa, 2013).

A Library Management Software or Automated Library System usually consists of a number of functional modules, such as acquisitions, circulation, cataloguing, serials, and OPAC (Online Public Access Catalogue). An "integrated" library system is an automated system, in

which all of the functional modules share a common bibliographic database. These systems are so designed that all the files are interlinked so that deletions, additions and other changes in one file automatically activate appropriate changes in related files. Nowadays, there are available various software and many are available in multi- user network versions. Today's LMSs are based on client-server architecture and facilitate access to other servers over the Internet. These systems allow accessing multiple sources from one multimedia interface. Customized report generation, manipulating data and investigating various scenarios are possible in these LMS (Dempsey, 1996).

There are two categories of Library Management Software and they are: Free/Open Source software and Proprietary software. Free/Open Source software will be the focus of this study because New-GenLib is an example of Free/Open Source software which is in use in Kano University of Science and Technology.

Free/Open source is a software development model as well as a software distribution model, where the source code of programs is made freely available with the software itself so that anyone can see, change, and distribute it provided they abide by the accompanying license. In this sense, open source software differs from the closed source or proprietary software which may only be obtained by some form of payment, either by purchase or by leasing. The primary difference between the two is the freedom to modify the software. According to Ukachi (2012) the advent and development of Open Source Software in the present age, has made the transition from "traditional" to "technology based" library services, which gives room for more efficient service provision, very easy and cost effective hence, libraries are now adopting them in their technical services, digitization processes, and general library management.

Some of the characteristics of open source software that makes it suitable for use in libraries according to gbdirect (2011) include:

Source Code: The OSS come with their source code, and allows distribution of same. Where some form of the product is not distributed with the source code, there is a well-publicized means of obtaining the source code which is usually downloading it via the Internet without charge. The source code is provided in the form in which a programmer would be able to modify the program. Obscure source codes or Intermediate forms such as the output of a pre-processor or translator are not allowed for OSS.

Free Redistribution: The license does not restrict any party from redistributing or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license does not require a royalty or other fee for such distribution.

Derived Works: The license allows modifications and derived works, and also allows them to be distributed under the same terms as the license of the original software.

No Discrimination against Persons, Groups and Fields of Endeavour: The license does not discriminate against any person or group of persons. It does not also restrict anyone from making use of the program in a specific field of endeavour. For example, it does not restrict the program from being used in a business, or from being used for genetic research. It is meant for everyone and, in every field of endeavour.

License Must Not Restrict Other Software: The license does not place restrictions on other software that is distributed along with the licensed software. For example, the license does not insist that all other programs distributed on the same medium must be open-source software. License Must Be Technology-Neutral: The provision of the license is never predicated on any individual technology or style of interface.

OSS has different functions such as operating systems, library management system, digital library / institutional repository, learning management system and content management (Hanumappa et al., 2014; Njoku, 2017). The reason OSS has been so successful is that it provides users with flexibility to choose the technology best suited for their needs without being tied to a particular vendor solution. The license-free and royalty-free nature of OSS reduces the capital costs of creating new solutions. Thus, Open source software has become widely accepted in libraries because of their numerous benefits. This is evident in various studies that have been conducted on adoption of open source software in libraries. A study conducted by Adegbore (2018) on, Adoption Factors of Integrated Library Management Systems (ILMS) in Selected Nigerian University Libraries, revealed that out of the 28 University libraries studied, 15 of the university libraries make use of open source software. The study also went further to examine the reasons for adoption of open source software and part of the reasons include: the system's ease of use, provision of interactive features between users and systems, universality, free and ability to customize it to suit their requirement, financial freedom, robustness, flexibility and maintenance effectiveness.

As interesting as the adoption of open source integrated library software is to libraries, there are some factors that can affect their effective adoption and implementation in libraries and they include: user requirements, lack of needed infrastructure (hardware, software, network), lack of support from software developers, availability of user group for the software, and lack of technical know-how. (Ukachi, Nwachukwu, and Onuoha, 2014).Scholars have indicated that libraries simply do not have the in-house expertise to support OSS development, and also do not have the ability to train their staff to become competent to use the software (Kamble, Hans Raj & Sangeeta, 2012). Similarly, findings on a study by Mohamed and Lakshmi (2016), on the adoption of Open Source Software for Library Management, shows that 35.29% of the library professionals do not have the competence to use OSS and also it is not easy to use; 35.29% sees less availability of hardware as a factor; 31.37% said they do not get proper training; 29.41% of library professionals see lack of finance as a factor affecting the adoption of Open Source Integrated Software.

Kano University of Science and Technology Library and the adoption of NGL

The Kano University of Science and Technology (KUST) Library was established in April 2001, to support the then six undergraduate programmes of the university, domiciled in two Faculties namely; Faculty of Agriculture and Agricultural Technology (FAAT) and; the Faculty of Science and Science Education (FASSE). The Library was then housed in the former Student's Dining Hall of the former Wudil Teachers College, with a modest collection of about 2000 volumes of books and 525 volumes of journals and other documents.

However, the University has, in the last ten years, grown from two faculties to seven faculties, twenty-seven departments, Postgraduate School (PG), Entrepreneurship Development Centre, Centre for Continuing and Innovative Education (CCIE), and the Division of Agricultural Colleges (KUSTDARC) among others. The population of both staff and students has also grown very rapidly over the years.

Accordingly, the library has expanded in conformity with the general expansions of the University. It is now made up of the main library, six (6) Faculty Libraries and over 20 Departmental Libraries as well as an Electronic (E-Library) facility equipped with over two hundred and fifty 250 fully networked computers. The e-library stores and provides access to both on-line and off-line resources to the university community. For instance, the library

subscribes to electronic databases like EBSCO, Science Direct, EGRANARY, TEEAL, Nigerian Virtual Library to mention a few.

In order to be in line with the global best practices, the KUST library has adopted and installed the NewGenLib open sources LMS in 2016, for the purpose of automating it resources and services. The library is one of the early adopters of NGL, particularly among university libraries in Nigeria   It is against this backdrop that this paper attempts to examine the level of implementation of the NGL software in the KUST library with a view to identifying the challenges and solutions to the effective implementation and use of the software in the operations and services of the library.

Features of the NGL Software

The NewGenLib (NGL) is an open source integrated library software (OSILS) that was designed to enhance library services. It was launched as open source during 2005. According to the software homepage (http://www.verussolutions.biz/web/node/18) "it is the result of collaboration between domain specialists in library automation and software specialists." The Kesavan Institute of Information and Knowledge Management (KIIKM), a professional body at Hyderabad has provided the said domain knowledge. The software development expertise has come from a company called Verus Solutions Pvt. Ltd. A Memorandum of Understanding of above mentioned organizations has been signed to keep the product up to date both by domain specialists and software professionals'. It has capability to create fully automated library.

With the release of NewGenLib2.1 as OSS version, many libraries in India like Learning Resource Centre(LRC) of Indira Gandhi Institute of Technology, Knowledge Centre of Birla Institute of Management Technology (BIMTECH) and others, have experimented with it and implemented it. In September 2011, a new version [3.0.] was released. From then on, the developers have been releasing several bug fixes and upgrades and new functionality features quite regularly. The support for many libraries that now use the software in India, SE Asia, Africa and the Middle East is based on remote desktop applications that involve both developers and users in one or more interactive sessions. The current release is now available on cell phones and tablets running Android 2.1. or above.

Salient Features of Newgenlib Open Source Software include:

1. **Licencing:** It is open source under the most widely used open source software licensing system called GPL (General Public License).

2. **Source Code & User Manual:** The open source binaries and source code can be downloaded. Installation notes for Linux and Windows are also available at the site. The user manual is also downloadable.

3. **User's Feedback:** The users of the software can post their feedback with views, problems, solutions, discussions, etc. to the organization.

4. **Architecture & Backend:** It is web-based and has a multi-tier architecture; it uses Java (a swing-based librarian's Graphical User Interface) the JBoss (J2EE-based Application Server) and PostgreSQL as default backend.

5. **Functional Modules:** NewGenLib's functional modules are: Acquisitions management (monographs and serials); technical processing; circulation control; system configuration; a desktop reports application and an end-of-day process (scheduler) application.

6. **Data Create & Exchange Format:** NewGenLib open source is compliant with Machine Readable Catalogue (MARC-21) format. It has a MARC editor. It allows seamless bibliographic and authority data import into cataloguing templates.

7. **Mail Server:** SMTP mail servers can be configured for emails that can be sent form functional modules.

8. **Open Access Compatibility:** NewGenLib open source allows creation of institutional open access (OA) repositories compliant with the Open Access Initiative

9. **Unicode Compatibility:** NewGenLib open source is Unicode 3.0 compliant.

10. **Radio-frequency identification (RFID) Technology:** It is RFID ready.

Advantages of Newgenlib Open Source Software

The advantages of NewGenLib open source may be perceived as follows in the light of the advantages of open source software as pointed out by Richard (2008):

1 **Ability to tailor to fit local needs:** The availability of the source code means that a user can modify and enhance the software to more closely fit its own needs. Unlike with proprietary products, the user, not a vendor, sets the development priorities. The user is also able to set its own priorities for bug fixes.

2 **No restriction on use:** unlike commercial software, there are any contractual restrictions on how the software is used. While some developers use the GNU General Public License that assures users that they have the right to distribution and those to whom they

distribute also have the right to modify and distribute, other developers merely declare that their software is in the public domain. A subsequent user may, therefore, decide to protect the enhancements that it makes by copyrighting them.

3   **Low cost:** There is no charge for the software; therefore, the capital outlay required by commercial software is avoided. The major costs are on-going development and maintenance. If the number of users is large, and they share their efforts, each user's cost is reduced. However, if the number is small or a user does a lot of tailoring to fit unique local needs that are not shared by other users, the cost can escalate.

Objectives of the Study

The main objective of this paper is to examine the challenges in the adoption of NGL Open Source Software in KUST Library. The specific objectives are to:

1. Examine the level of implementation of the NewGenLib library management software in the operations of KUST library;

2. Identify the challenges to the effective implementation of the NGL in the library Operations;

3. Identify the strategies to solve the identified problems.

Methodology

A qualitative approach using a narrative design was employed in collecting data for the study. An interview guide was developed by the researchers and used in conducting interviews with 4 heads of library departments, namely; H.O.D., Information Resources Development; H.O.D., Reader Services; H.O.D., Serials and Documents; and H..O.D., E- Library and Automation. However, in some cases, the H.ODs assigned the most senior staff in his/her department to give the interview.

Each H.O.D was interviewed on the state/level of implementation of the software in his department, challenges being encountered and the strategies towards overcoming the challenges. The University Librarian was also interviewed to know how the library came about adopting NewGenLib Integrated Library Management Software. The interviews lasted for about 30minutes each and the responses were documented.

FINDINGS

1. **Adoption and Reasons for the Adoption of NewGenLib(NGL)**

The University Librarian was interviewed on the adoption, reasons for the adoption, level of implementation, challenges and strategies for the effective implementation of NGL software in the KUST Library and the responses received are presented and analysed below:

Question 1. : When was the NGL acquired by your library?

University Librarian: "the *Software was acquired in the year 2016."*

Question 2: What infrastructural tools/ facilities were put in place for the adoption, installation and implementation of the software?

University Librarian: the tools available in the library for the adoption of NGL Software include:

>   a. *Internet facilities*
>   b. *Routers*
>   c. *Systems*
>   d. *Inverters*
>   e. *Technical personnel*
>   f. *Generator*

Question 3. : What are the reasons/purpose for the adoption /acquisition of the software?

University Librarian: *We acquired it in order to provide*:

>   a. *Effective and adequate dissemination of the required information by the library users in general.*
>   b. *In order to ease the work of the library staff.*
>   c. *To ensure hitch free work flow in the library.*
>   d. *To allow users gain easy access to information materials.*

Question 4. : What is the level of implementation of NGL in the library? To what library operations has the software been used so far?

University Librarian: *Presently the software has only been adopted in the cataloguing and classification process in the library.*

Question 5. : Are you happy/satisfied with the level of implementation of the software in the library?

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University Librarian: *Very happy.*

Question 6: What Challenges are being faced in the implementation of the software in the library?
University Librarian: the *challenges we face* in the implementation of the software *include funding, replacement of facilities, bandwidth capacity, power supply, Internet fluctuation, poor technical knowledge by the users and the library personnel.*

Question 7: How are these challenges being addressed? or How do you plan to overcome the challenges so that the can be Implemented effectively by the library?
University Librarian: the strategies include:
  a. *Training and retraining of staff*
  b. *Supports from philanthropists, NGOs, Government*
  c. *Creating awareness among the users*
  d. *Giving staff incentives to motivate them*
  e. *Provision of alternative means of power supply*.

   2. Level of Implementation of NGL in the Operations of KUST Library Departments.
Four heads of library departments were interviewed on the level of implementation of NGL particularly in the operations of their departments as well as their perception on the adoption of NGL in the libray. The responses received are presented as follows:
Question1: What is the level/state of implementation of NGL to the Functions of your department/ unit?
RESPONSES:
   HOD Technical Services: *We maintained using NGL for more than two years, we have entered more than 2,000 titles of information resources, NGL is functioning very well in this unit.*
   HOD Automation/E-Library: *Is in progress*
   HOD Reader services: *In process*
   HOD Serials &Document: *In process*
Question 2: What is your perception generally on the level of implementation of the NGL in KUST library?

RESPONSES:

HOD Technical services: *It was implemented and highly in use more especially in cataloguing and classifying library resources more especially monographs. The adoption of NGL make work easier and faster.*

HOD Automation/E-L library: *It has really affected the management of the library positively*

HOD Reader Services: *It has improved the management of the library services*

HOD Serials/Documents: *It has positively affected the library services*

3.   **Problems encountered/challenges to the effective Implementation of NGL**

The Four heads of library departments were interviewed on the problems they encounter in the implementation of NGL particularly in the operations of their departments as well as the challenges faced. The questions and responses received are presented as follows:

Question 3: What problems are being faced in the implementation of NGL in your department unit?

RESPONSES:

HOD Technical Services: *Problems encountered include, Internet access, lack of constant power supply, lack of interest from library staff, insufficient computers to be used in creation of Online Public Access Catalogue.*

HOD E-library/Automation: *Some of the problems include: Network access, Standard power supply, Lack of adequate staff*

HOD Reader Services: Problems encountered include: *Lack of constant power supply, Lack of technical know-how, Lack of professional staff, Lack of adequate fund*

HOD Serials/Documents: Problems encountered in the unit include:*Lack of constant power supply, lack of training of the staff, lack of fund,lack of professional staff*

Interview Question4: What do you think are the challenges affecting the implementation of NGL in the library generally?

RESPONSES

HOD Technical Services Department: *Challenges affecting the implementation of NGL in the library generally include: Lack of interest from library staff;Problem of internet access; Lack of constant power supply;*

E-Library/Automation Department: *Challenges affecting the implementation of NGL in the library generally include, standard power supply**, fluctuating network**, lack of proper staff training on the use of NGL*

HOD Reader Services*: The major challenge affecting the implementation of NGL in the library generally is lack of staff training*

HOD Serials and documents*: The major challenge affecting the implementation of NGL in the library generally is lack of training and retraining of staff*

4. **Strategies for the Effective Implementation of NGL in the library(Technical Services**

The Four heads of library departments were interviewed on the strategies for the effective implementation of the NGL in the library. The questions asked and responses received are presented as follows:

Question 5: What strategies would be adopted that will ensure the successful implementation of NGL in the library?

RESPONSES:

HOD Technical Services: *The library management should put the following into consideration:*
   a. *Staff should put more interest in the creation and use of OPAC*
   b. *Constant internet access*
   c. *Provision of alternative means of generating power*
   d. *Availability of computers and other working tools*
   e. *Training and retraining of library staff on the use of NGL software*
   f. *Library should provide incentives* and reward system for staff

HOD Automation: *The library should focus on:*
   a. *Training of staff on the use of the software*
   b. *Provision of enough ICT tools for the implementation of NGL software*
   c. *Provision of network facilities*

HOD Reader Services: the library management should provide:

a. *Adequate funding*

b. *Training and retraining of staff*

c. *Conferences, seminars and workshops*

d. *Provision of alternative means of power supply*

HOD Serials/Documents: The library management should focus more on the training and retraining of staff on the use of the software.

5. Background information on the subjects of study
A. Technical Services Department

Interview Question 1: Name of the library Dept/unit you work with

Response: Technical Services/ Cataloguing and Classification Unit

Interview Question 2: Your Position/Rank

Response: Head Technical Services Department/Head Cataloguing and Classification Unit

Interview Question 3: Describe some of the major functions performed by your dept/unit

Response: Some of the major functions include:

a. Classifying all library collections

b. Filling catalogue cards

c. Creating OPAC

d. Maintenance of manual catalogue and OPAC

E-Library/ Automation Department

Interview Question 1: Name of the library Dept. /unit you work with

Response: E-Library

Interview Question: Your Position/Rank

Response: Senior Library Officer I

Interview Question: Describe some of the major functions performed by your dept/unit

Response: Provision of internet services and giving students and staff access to the network

B. Readers Service Department

Interview Question 1: Name of the library Dept. /unit you work with

Response: Readers Service Department

Interview Question 2: Your Position/Rank

Response: Senior Library Officer I

Interview Question 3: Describe some of the major functions performed by your dept/unit

Response: Functions of the unit include:

a. Charging and discharging
b. Shelving and shelf reading of library materials
c. Registration of library users
d. Circulation services

Serials and Documents

Interview Question 1: Name of the library Dept. /unit you work with

Response: Serials

Interview Question 2: Your Position/Rank

Response: Senior Library Officer I

Interview Question 3: Describe some of the major functions performed by your dept/unit

Response: Functions performed in the unit include:

a. Shelving of serial publications
b. Guiding the students on how to go about their research

DISCUSSION OF FINDINGS

The first specific objective of this study was to examine the level of implementation of the NGL library management software in the operations of KUST library. This objective was achieved through the interview question asking the various head of departments of the library about the level of implementation. Based on the responses it was observed that presently the software has been fully adopted only in the cataloguing and classification process of the library, other modules of the software have not been fully adopted.

The second specific objective of the study was to identify the challenges to the effective implementation of the NGL in the library Operations. The responses from the head of departments and the University Librarian shows that the major challenges affecting the implementation of the software include: Lack of interest from library staff, Problem of internet access, Lack of constant power supply, Lack training and retraining of staff, Technical know-how, Lack of fund, Inadequate facilities. All these challenges corroborate the assertions of Ukachi, Nwachukwu, and Onuoha, 2014; Mohamed and Lakshmi, 2016; Kamble, Hans Raj &

Sangeeta, 2012 in their various studies on the challenges faced by libraries in the adoption of Integrated Library Management Software.

The third specific objective of the study was to identify the strategies to solve the identified problems. The head of departments and the University Librarian identified some strategies which include: provision of alternative means of power; organizing of seminars, conferences, workshops for the training and retraining of the library staff on how to use the software; adequate funding of the automation project; supports from external bodies like philanthropists, NGOs, Government; creating of awareness among the library users about the importance of the software.

CONCLUSION

In conclusion, the KUST library has adopted and installed the NGL in 2016, for the purpose of automating it resources and services. The NGL is an effective open source integrated library management software that is increasingly being used and recommended for use in library automation projects because of the tremendous benefits it offers. Its implementation in the KUST Library started with the exploration and experimentation of the Cataloguing module, where over 2000 cataloguing entries have being made. It seems that other features of the software such as the acquisition module, serials module, and reports and administration modules will be experimented with in due course. While implementing the NGL in the KUST library, some difficulties were faced, and also some limitations of some modules were noticed. These included lack of IT infrastructure, technically skilled professionals, IT staff, and epileptic power supply. There is\ also the lack of interest among library staff to apply new technology immediately. This may not be unconnected with the fact that the library staff have little or no knowledge about ILMS, since it is the first time that the library is experimenting with a software in their operations.

It is therefore apt to suggest that libraries considering adoption of any LMS should carry out proper planning, prior feasibility studies, training and resource mobilisation if proper implementation is to be achieved.

Recommendations
Based on the findings, the following recommendations were made:

a. The library management should extend the implementation of the software beyond the cataloguing and classification department of the library i.e. other modules of the software should be activated.

b. The library management should organise seminars, workshops, and provide regular hands- on training where staff can learn how to use the software.

c. There should be a robust and alternative means of power in the library e.g. supply of inverters, solar energy solutions etc.

d. Library staff should be encouraged to embrace the automation project going on in the library. The Library management, for instance, should create a reward system to appreciate staffs that are diligent and keen in using technologies in discharging their duties.

e. The library management should increase the bandwidth of the internet in order to tackle the issue of lack of internet access.

f. The library management should engage in awareness campaign to allow the users know about the importance of interacting with the software when searching for information materials in the library.

g. Proper planning including prior feasibility studies on practical considerations is recommended for libraries planning to adopt and implement any ILMS.

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