



LIBRARY AUTOMATION AND THE OPEN SOURCE SOFTWARE: A REVIEW OF LITERATURE

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ABSTRACT:

This article deals with literature reviews related to history and evolution of library automation, case studies on library automation, Open Source Software (OSS) and comparative studies on OSS and their problems.

Article also reviews thoughts and definitions expressed by various authors towards OSS concept and OSS movement at national and international level. The article shares the knowledge and experience of over 50 authors from different parts of the world.

KEYWORDS : Library Automation, Open Source Software, OSS, Literature Review, Library Management Systems, Koha, In-house Software.

1. INTRODUCTION:

Reviewing of the literature in the area of research is the preliminary step before attempting to plan the study. A critical review is a means of evaluating and interpreting all available research relevant to a particular research question, topic, area or phenomenon of interests. This process contains three phases, viz. planning of review, conducting of reviews and reporting of the reviews. A review of literature gives in-depth knowledge related to the subject matter which helps to reveal the gaps remained in the available literature and provides direction, guidance and sometimes even different perspectives to look at the particular question. In a nutshell, it serves the purpose of providing a background related to the earlier studies, reports, articles, books etc. It gives a proof that the present study has already taken note of what others have done and written in the concerned area. Therefore, it is necessary to review all kinds of literature related to the subject matter.

2. LIBRARY AUTOMATION: HISTORICAL DEVELOPMENTS

In 1936, D.S. Harder has used the term "automation" to mean automatic handling of parts between progressive production processes. The word "automation" has been derived from Greek word "Automose" it means something, which has power of self-movement or spontaneous motion.

2.1 History and Evolution of Library Automation:

According to Raizada (1965), first attempt of library automation can be traced after 1960. The Indian libraries and information centers had made efforts to 'automate' their libraries for providing information services with punched card systems. A couple of second generation computers were used at Kanpur and Bombay. In 1964,

INSDOC was the leader in experimenting with computers for their application in documentation and informational work. Haravu & Raizada (1967) carried out an experiment with IBM 1620 for computerized data retrieval, as part of this course in documentation and reprography conducted by INSDOC. The program for this experiment was written in FORTRAN 11 D language.

Harold (1966) submitted a paper on "Experimental Studies in Automated Document Classification" where he presented his studies in the use of factor analysis a mathematical technique for deriving classification categories for a set of documents. In 1969, an attempt was made to develop and complete an integrated program deck (level) to process the union catalogues for Mysore (now Karnataka) using the computer facility at Delhi School of Economics. According to Murty & Arora (1974), the next experiment carried out at INSDOC for preparing author and subject indexes to Indian Science Abstracts.

In India, computers were used in library for the first time possibly by INSDOC when they computerized the author and subject indexes of 'Indian Science Abstract' in 1965. Then in 1967 the INSDOC has brought out with the 'Roster of Indian Scientific and Technical Translators' with the help of computers. In 1978 INSDOC initiated SDI service as a NISSAT project with Chemical Abstracts and INSPEC data-bases, with the use of CAN/SDI software of IIT, Madras.

After, getting a financial support of NISSAT, many library networks were initiated and are operative, some of notable (famous) of these networks are CALIBNET (Calcutta Library Network) and DELNET (Delhi Libraries Network), INFLIBNET (Information and Library Network) PUNENET (Pune Library Network) etc. Among other networks notable are NICNET, INDONET, SIRNET etc.

In one of the research papers, Pandey & Sharma (1995) trace history of library of automation. H.P. Luhn had organized computerized indexes in 1950s. During 1960s the cost of hardware was slashed down and appreciable attempts were made towards development of library application packages. In April 1960 the American Chemical Society published its 'Chemical Titles' using computers. In the year 1963 W.K. Gilbert prepared a report on computerization of Library of Congress. On the basis of this report, MARC-I project was started in 1966 and the work of bringing out of the Library of Congress Catalog in Machine Readable Catalog (MARC) form was started and completed.

In the book titled, "Redesigning the Library", Mahapatra & Chakrabarti (1997) have discussed journey of printed bibliographical database and its conversion to electronic format. According to Haravu (2009) discussed the evolution of library management system, changes occurring in information technology, user expectations and searching behaviors. In 1960-1970s, MARC standard (Machine Access Readable Catalogue) was used for bibliographic records.

Phadke (2012) states the history and evolution of library automation. According to him, in 1936 the first efforts were taken for library automation by the University of Texas, in which they used a mechanical system in their circulation function. In 1940-1949 IBM introduced computers in circulation function for semi mechanical applications by including edge-notched cards, optical coincidence and Peek-a-boo card system. The library automation first introduced in 1950s in America (USA) but it has really grown in the next decade after reducing prices of computers. In 1950-1959 the period of punched cards has been known for development of data processing equipment's and micro image searching systems. Dr. H.P. Lune has made the first computational index in 1957, at that time the first step of library automation was completed by making computerization of the cataloguing cards and developing their indexes.

2.2 Case Studies on Library Automation:

Bhardwaj & Shukla (2000) describe the issues explosion of information and shortage of space, the growth of users, cost hike in printed as well as electronic materials- and benefits of resources sharing. The authors simplify the steps of software selection with the comparison in between some leading softwares.

A case study report by Faisal & Surendran (2008) on Kendriya Vidyalaya namely 'Automation of Library at Kendriya Vidyalaya, Pattom Thiruvananthapuram, authors have given information on advantages of library automation, steps involved in library automation and draft plan to automate the library with "Libsoft" integrated library management system. In a research paper, Hopkinson (2009) discussed last 25 years history regarding

library automation and also found out the library automation research trends. He had focused on developed and developing countries scenario. According to him, open source software is the solution for realizing the economic problem.

Choudhari (2010), in his research paper focused on challenges to manage the libraries in 21st century. They discussed budget, extensive library services, e-resource management, and impact of IT in library administration. In the concluding remark he suggests, library automation is essential aspect for providing the services to the library users. Singh (2003) has discussed library automation and the major role played by various library networks for information dissemination. Author has also discussed the efforts being made in academic libraries / institution like IITS, IIMS etc.

Trapthi & Prasad (2010) mentioned the current situation about limitations in library budget, open source software movement, the implementation of OSS in e-governances, e-publishing and so on. They also recommended "Koha" as the free and open source software to automate all the activities of a library. Tiwari (2010) gave the definition of library automation stating, library automation is the application of computers to perform traditional library housekeeping activities such as acquisition, serial control, administration, circulation OPAC and reports. Author also focuses on the impact of library automation can extent the quality of cataloguing information presented to the user choice.

3. METHODS OF LIBRARY AUTOMATION:

Phadke (2010) discusses three ways of library automation, viz. in-house software, commercial library software and open source software. According to him, library automation using in-house software is better as compared to commercial software due to cost factor. Library automation using open source software can be 'free software' or 'Open Source Software'

4. CHALLENGES FOR LIBRARY AUTOMATION IN INDIA:

According to Altman (2001), many commercial library software developers have also ignored data entry support with library standards such as MARC 21, AACR-II, etc. that are available for cataloging and classification. Kulkarni & Shewale (2014) observed that there are variations in the cataloguing and in classification numbers from library to library. In India, many university and college libraries are in the process of creating online public access catalogues (OPACs) after the automation, many software developers ignored the basic principles of classification and cataloguing system at the time of library software development resulting in non-standardization of the library management system.

Swar & Pandey (2008) have discussed the challenges in the higher education system in India. According to authors, Indian higher education system is suffering from lack of funds, autonomy, burden of affiliations etc. The real weak point of Indian higher education system is structural, and there is a need for rapid development in technology and communication. One more case study sponsored by Red Hat Pvt. Ltd, on Economic Impact of Free and Open Source Software - A Study in India, by Rahul, De (2009) focused on cost of operating system, cost of antivirus and other office tools, which is being used for servers and desktops selling in India. Bharti (2010) has mentioned the challenges of new developments in IT industry. Library is also affected by the rising cost of technology, reduce in staff, devaluation of rupees against major currencies and budget cut are the major concern.

5. OPEN SOURCE SOFTWARE:

Many research scholars have studied and stated history and growth of open source software. Krishna (2001) has written the book entitled "Technological Future of Library and Information Science". They discuss various aspects in library and information science technology, customer care, information education and evaluation are the major aspects discussed.

5.1 History and Growth of Open Source Software:

According to Coyle (2002) Open Source Software (OSS) has wider scope in software industry. Open

source software has been used extensively in various industries for operating system (OS) like Linux, Mobile OS - Android, MySQL - database, application programming language- Java, Web scripting language - PHP, Web server - Tomcat etc. He continues saying, open source technology is used in creation of digital libraries like, Greenstone, DSpace and EPrints etc." On the other hand library management software like Koha, Evergreen, NewGenLib and e-Granthalaya are being used for library automation housekeeping activities. Chavan (2007) concluded NewGenLib and Koha softwares are good softwares for college libraries and both software fulfill maximum need of college libraries. Yet, NewGenLib software is better than Koha to use in Indian college libraries.

Gokhale (2008) focused on library management softwares used in various Management institutes in Mumbai city. Researcher has commercial library management softwares as well as in-house library management software, in the service point of view. Here, the researcher was not able to focus on expenditure and benefits of LMS, due to limitations of study.

According to Pandey & Verma (2010) keenly focused on brief history of open source software pointing out year wise steps of evolution in open source software. In 1969, there was a creation of UNIX in AT and T Bell Labs. In 1973, there is a growth in popularity of UNIX. In 1983 there was a development of ARPANET into what is today known as the Internet. Then 1985 Richard Stallman, a programmer at the MIT AI Lab, starts the Free Software Foundation (FSF) intended the word 'free.' became associated with zero cost, which seemed an anti-commercial response to trends in software world towards proprietary software packages and non-access to source code. He started to design a new operating system called, GNU.

According to Dangi, Kumar & Verma (2010), an OSS is typically created and maintained by developers crossing constitutional and national boundaries by collaborations by using internet based communication and development tools. Output is generally a certain kind of "free" often through a license that specifies that applications and source code are free to use, modify and redistribute it as long as all user, modifications are similarly licensed. Quality, not profit, drives OS developers who take personal pride in seeing their working solution adopted.

Tamane (2011) has focused on current situation of library automation in Sinhgad Institutes, Pune, as well as studied library management software. Author, suggested commercial library management softwares are working properly for providing the services, but researcher was not able to focus on their expenditure due to limitations of study.

Sudge (2012) directed towards the present status in defense training and educational institutes in the light of information technology and its applications. Researcher has suggested a model for defense education and training libraries for adopting benefits of electronic publications with the help of networking technology. Kemdarne (2012) focused on various library housekeeping operations and also studied various OSS packages and concluded 'NewGenLib' open source software is a good option for networking the libraries for reducing the cost of Library automation.

Randhawa (2013) discussed the advantages, limitations of open source softwares mainly focusing on open source software like, Koha, Evergreen, ABCD, SENAYEN, BiblioteQ. Author suggested, librarians and programmers should work together in order to implement open source integrated library systems and at the same time, library professional are also required to acquire new skills for developing and managing the library by using open source LMS.

5.2 Meaning and Definitions of OSS:

Free Software Foundation (1986) codifies four essential freedoms that computer software users should be entitled to, run the program for any purpose, study how the program was and adopt into your needs, redistribute copies, improve the programme and review your improvements to the public.

According to Sasikala (2005), Open source software can be defined from different point of views:

- Open source software is typically created and maintained by developers crossing institutional and national boundaries, collaborative by using internet-based communication and development tools;
- Products are typically a certain kind of "free", often through a license that specifies that application and source

code (the programming instruction written to create the application) are free to use, modify, and redistribute as long as all users, modifications, and redistribution are similarly licensed;

- Successful application tend to develop more quickly and with better responsiveness to the needs of users who can readily use and evaluate open source application because they are free;
- Quality, not profit, drives open source developers who take personal pride in seeing their working solutions adopted.

5.3 Main Aspects of Open Source Software:

According to Open Source Initiative (OSI) 1998, open source software are, free redistribution, source code, derived works, integrity of the author's source code, no discrimination against persons or groups, no discrimination against field of endeavor, distribution of license, license must not be specific to a product, license must not restrict other software and license must be a technology (neutral).

Altenhoner & Bibliothek (2005) discussed the main aspects of open source software as:

- Free re-distribution
- Accessibility of the quell code
- Changeability of the code and reuse in new software
- Inviolability of the original code
- No discrimination of certain persons or groups
- No restrictions for certain areas of usage (especially restrictions to commercial sectors)
- Distribution of the license, (no distribution with new rules!)
- License must not be valid for a certain product (e.g., as part of a software distribution)
- License must not compromise other software (that, e.g., is also included at the same data storage; disclosure agreements)

5.4 Need of Open Source Softwares (OSS):

Kumar (2005), expresses his views on OSS. The Price of commercial library management softwares is very high and financially weak libraries cannot invest large amounts for library automation. Annual Maintenances Charges (AMC) is required for software updating and maintenance. Library community is largely made by not-for-profit, publicly funded agencies. The principles and practices of open source software are very similar to the principles and practices of modern librarianship. Both value free and equal access to data, information, and knowledge. Open source library management softwares consist of the entire essential functional module which was available with proprietary or commercial softwares.

Randhawa (2013) expressed some limitations regarding OSS. According to Randhawa, at the time of upgradation of open source software, library needs support, for that library has to hire some experts help or make to arrangement with some big company.

6. COMPARATIVE STUDIES OF COMMERCIAL SOFTWARE AND OSS:

Kumar (2005) discussed free and open source softwares. Author has also compared Koha, PhyMyLibrary and OpenBiblio library management system in terms of facilities. Farzana & Khalid (2007) reviewed current status of software used in the libraries of Lahore, to explore the satisfaction level of the software users, and to find out their problems and suggestions. To fulfill the research objectives, researcher has used survey technique. They conducted survey of automated libraries in Lahore for comparing academic (university, college, and school libraries), public and special libraries. They collected opinions from the whole population and data was analyzed quantitatively and qualitatively, and conclusions were drawn along with some recommendations. This research is limited to the automated libraries of Lahore and focuses on the comparison of software and determining librarian's opinions. The comparative analysis of softwares is helpful for foreign and local vendors of library software. It also provides guidelines for libraries in developing countries, which are planning to automate their library services, helpful in selecting and maintaining software and choosing the most suitable library automation

software to fulfill their library needs.

Kushwah, Gautamand & Singh (2008) compare library management softwares on the basis of discussions with the library community in India. It includes the information available in related literature. Features of library automation software, which are mostly in practice by libraries i.e. Libsys, SOUL, are compared with open source system KOHA. For this purpose they conducted a survey of 57 various types of libraries as a sample. While surveying libraries, they had a discussion with library managers where they expressed problems, in using, Libsys, SOUL and other library management systems. These problems can be summarized as, high cost, new version or new feature, additions are charged heavily. 10% to 20 % cost of total price is charged as a maintenance cost especially by commercial vendors, some software have not introduced any new addition after its first version is released.

Singh & Deka (2008) focused on different open source software. This paper discusses the problems of library automation in Assam in terms of economic aspects, trained manpower, negative attitude of authorities and most cases the library professionals are not conversant (familiar) with the library automation environment. They predicted, in the near future libraries may think to adopt open source software. Open source software has a very good prospect for automation of libraries and information centers in Assam, in economic and service point of view.

Hasan (2009) tried to find out the list of open source software, its characteristics, its benefits, drawbacks and future challenges. It gives an introduction of the OSS concept, describes the open source software and explains the meaning and definition of the term open source software. It also explains some important issues with reference to the explanation of the open source software.

Singh & Barik (2010) discussed benefits of open source software, difference between open source software and commercial software, future of open source software. Also focused on some library automation software packages like, Koha, NewGenLib, Evergreen, PMB, Athenaeum Light, Avanti, Firefly, Java Book cataloguing system, ITIL Library management system, My Librarian, My Library, OpenBiblio, Open Book Open Source Library System, Open-LIS, PhpMyLibrary, Sean Soft Library Loan Management System. In the concluding remark author says, though open source concept is of one or two decades origin, it has taken a special place in the field of library automation. Most of the small and financially weak libraries are taking steps to accommodate this software. Authors also say, like commercial software it is most users friendly and flexible.

Tripathi & Prasad (2010) have edited twenty two selected research papers and case studies presented in the national level seminar on OSS library solutions held by department of LIS, Banaras Hindu University, Varanasi. These papers contain introduction of OSS, applications of OSS, e-resources knowledge management, future of open sources library solutions etc. In this book foreword message is written by A.R.D. Prasad, he writes OSS has come up to liberate library community. Librarians can implement OSS in the areas of library management system, digital libraries, e-publishing consortium management system. Koha is free and OSS (FOSS) automation tool to automate all activities of library. He also observed that many of the librarians hesitate to work with the OSS. They find it difficult to adopt OSS model with a fear of handling such systems. Apart from this many library professionals find they are uncomfortable with new technology and want someone else to handle on their behalf. This dependency creates monopoly in favors of vendors and often leads to kind of blackmail situation for library system customers.

Vasupongayya & Keawneam (2011) focused on various OSS by reviewing 15 open source library management system packages which are useful for library automation along with open source digital library software. The review focuses on the abilities to perform four basic components which are traditional services, interlibrary loan management, managing electronic materials and basic common management system such as security.

Don (2011) examines the adoption of the open source library management system, Koha, amongst Australian special libraries. This paper shows several Australian health libraries and special libraries have decided to join the Koha community. Author suggests, although libraries are adopting open source technology, they aware that open source is free and reduction in costs and time. Most Australian Koha installations have occurred in the last 3 years and few libraries have long-term experience with open source products. As the

number of open source system users increases, there will be increased pressure on support companies and developers for further enhancements of open source software. These developments will need to be managed efficiently and effectively to maintain the currently very high client satisfaction levels. Koha can be strongly recommended as an open source system worthy of consideration by librarians seeking a low cost web-based alternative to conventional library systems.

Egunjobi & Awoyemi (2012) make a strong case for the adoption of open source software in various libraries and information centers. They found out that there are several challenges and problems / constraints in the development of library automation system with open source software in Nigeria, i.e. poor information and communication technology (ICT) infrastructure, poor funding, and poor ICT skills among library staff, as well as choosing appropriate software solutions. It highlights the strategy adopted, major automation areas, and various factors to be considered by librarians when developing automation processes for their libraries. Authors feel automation can improve the libraries relevance to the academic community. It further reveals that, library staff enjoy working in an automated environment and the patrons enjoy services rendered using an OPAC instead of a card catalogue. The introduction of open source software such as Koha is therefore a positive revolution in libraries in Nigeria and other countries.

Mulla (2012) conducted a survey in Mysore city, to find out current status of library automation. According to Mulla, there are more than 30 academic and research libraries. He stated that, out of 23 libraries, only 17 libraries have computers and out of 17 libraries only 14 libraries have automated their library operations. In this study the investigators have touched various aspects related to library automation. The libraries that have not automated have given reasons for the delay to start automation work. Many libraries have network connections for sharing the information.

Institute of Museum and Library Services" (IMLS) funded the research of Singh (2012) related to comparison of open source softwares, Koha and Evergreen integrated library systems (ILS) to improve and understanding the OSS and technical support from the community. Author focused on benefits of open source products to gain the benefits related to customization, flexibility, the lack of vendor lock-in.

Brave & Dahibhate (2012) discussed different types of OSS, OSS benefits and drawbacks. They mainly focused on D-Space, E-prints, Drupal, Koha, Zotero, etc. According to authors, software KOHA has been installed widely across the world. They also expressed that many commercial library software developers have ignored data entry support with library standards such as MARC21, AACR-II, etc. In the concluding remarks they say, OSS is useful for saving time, money, and resources.

Reddy (2013) focused on the study of Free/Open source integrated LMS like, Koha, NewGenLib and e-Granthalaya. A thorough analysis of all these three LMS has been done and listed the features available in all the three software. In findings, researcher stated that, Koha and NewGenLib has more advanced and varied features than e-Granthalaya. According to the author, NewGenLib has more enhanced features which are significant for library automation and it can be selected as ILMS and e-Granthalaya has simple interface with less options and easy to use and install.

7. LIBRARY SERVICES AND FACILITIES USING VARIOUS LMS:

Kumar (2005) discussed the open source software features, which are under open license i.e. General Public License (GPL). They are compatible with Linux, Windows and Mac Operating system, Web interface, MARC support, Z39.50 standard, Barcode input and generator, Entire software is customizable, Active development status and worldwide user community, Multi-language support.

Thorave (2012) suggests that, web 2.0 might be useful to LIS professionals for dissemination of information and also to provide advanced services. Web 2.0 is all about user participation, it follows users need at central stage, model thought participation, open applications and services. The term "Open" in this context has two meanings, i.e. Open Architecture, and Open Standard. Discussed the tools related to web 2.0 technologies, i.e. Flickr, Orkut, Facebook, YouTube, Blogs, Wikis, RSS feeds, Podcasts, Scribed, weblogs, Instant Messaging, Tagging, Social Book marking etc.

7.1 Installation of OSS: Koha

Shewale & Barve (2011) in "LibLiveCD for Novice Users" provided information regarding Koha installation with the help of liveCD along with hardware requirements and software requirements for installing the Koha system. Omeluzor & Others (2012) shared their experience about installation of Koha. In concluding remark they expressed that, this work was based on facts and experiences gathered before and during the implementation period. It elaborates the basics and suggests steps toward successful implementation of ILS.

7.2 Data Migration Case Study:

Matoria & Upadhyay (2005) described their experience about data migration. The purpose of this study is to share the experience gained during the migration of library data from one LMS to another. They highlighted their experience regarding MINISIS, CDS/ISIS, TECHLIB PLUS, etc. to switchover to e-Granthalaya. According to them, step by step approach is useful to migrate the data from one system to another will be gives successful result.

8. CONCLUSION

Various studies have been carried out by the experts, researchers, and academicians in the field of library automation. There are a number of research articles; project reports as well as thesis submitted for Ph.D. and M.Phil degree level in the area of open source software and library automation. A lot of comparative studies of commercial library software packages vs. OSS have been conducted. Most of the researchers / scholars have conducted the comparative study of commercial library software packages. On the basis of above discussed literature, it is clear that a review of literature helps the researcher to determine the precise subject area. It helps to understand the importance, background and the present situation related to the subject selected for the research. So the investigation presents the first attempt and it would be an original and significant contribution to the literature on the concerned subject. It is revealed through review literature that the area of present study is unexplored and no study as on same to this topic has been done.

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