Issues and lessons learned in open source software adoption in Pakistani libraries

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Abstract
Purpose – The purpose of this paper is to identify and discuss key issues related to the adoption of open source software (OSS) in Pakistani libraries.

Design/methodology/approach – Literature review and principal author’s first-hand experience of Koha (OSS) implementation in Provincial Assembly Libraries of Pakistan under Pakistan Legislative Strengthen Project of United States Agency for International Development provide the information and insight for this paper.

Findings – Adoption of OSS in libraries is just at a beginning stage in Pakistan, and only a few organizations have so far made their first move in this direction. The major identified issues affecting OSS adoption in Pakistani libraries are: social (cultural) disparity, conceptual confusions, digital divide, lack of technological, financial, and human development.

Practical implications – The paper will help decision makers plan OSS applications in their libraries.

Originality/value – This is the first paper on the topic in Pakistan and explores the issues involved in OSS adoption in a comprehensive manner. The paper can provide understanding regarding adoption of OSS to professionals in Pakistani and other developing countries with similar environment.

Keywords Computer software, Open systems, Pakistan, Developing countries, Libraries

Paper type Research paper

1. Introduction
Open source emerged as an alternative model of software development. It has revolutionized the development of software and offers a number of attractions for libraries, especially for developing countries. Open source software (OSS) is computer software whose source code is available under a license that permits users to use, change, and improve the software, and to redistribute it in modified or unmodified form. It is often developed in a public, collaborative manner. Open source projects, usually, start as volunteer projects, and the developers’ community normally crosses national boundaries. Internet technologies facilitate the easy sharing and distribution of the project announcements, source codes, software, patches, etc. The philosophy behind open source model is mutual sharing of knowledge, expertise, and skills. The advantage is that, with the many people reviewing the source code, bugs are spotted and fixed with an impressive speed.
Since there have been no studies on the topic in Pakistan, this paper explores the issues involved in OSS adoption in a comprehensive manner and identifies and discusses key issues related to the adoption of such software in Pakistani libraries. It does this by means of a literature review and the principal author’s first-hand experience of Koha (OSS) implementation in Provincial Assembly Libraries of Pakistan under the Pakistan Legislative Strengthen Project (PLSP) of the United States Agency for International Development (USAID) which has provided the information and insight for this paper.

2. Literature review

OSS has many attractions for developing economies. Rajni (2003) conducted a comprehensive analysis on the significance of Free/Libre/OSS (FLOSS) for developing countries. The author considered, Free and OSS a useful and significant tool that can be helpful to solve many problems faced by the people of developing countries. The report identified low cost, anti-piracy campaign, security, and technological independence as factors behind the expansion of FLOSS in the developing world. The report also revealed that FLOSS activity is taking place in all the three regions: Asia, Latin America, and Africa. In the Asian region, India, China, Taiwan, South Korea, Malaysia, Singapore, and Thailand are the most active countries in this regard followed by Bangladesh, Pakistan, Sri Lanka, Nepal, etc. In Latin America, Mexico, Brazil, and Argentina are followed by Colombia, Venezuela, and Peru, while in Africa, South Africa is playing the leading role, closely followed by Kenya, Namibia, and Nigeria. There is also a significant activity starting in countries such as Ethiopia, Ghana, and Zambia.

Ribeiro (2007) mentioned that Asian governments are considering “open source as a boost for their economies and a way to increase technological innovation in the region.” Developing countries have made significant efforts in open source adoption. China benefits from strong government support for OSS (Yeo et al., 2006). India has introduced a number of projects to support OSS adoption (Sharma and Adkins, 2006). South American countries have also made significant progress in open source adoption (Hedgebeth, 2007).

In Pakistan, a milestone step has been the establishment of the Open Source Resource Center (OSRC), a project of Pakistan Software Export Board, Ministry of Information Technology in 2003. The objectives of the center are (OSRC, 2008a):

- raising public awareness about open source solutions;
- decreasing dependency on proprietary software;
- effectively addressing issues regarding intellectual property rights; and
- decreasing software deployment costs in the public, private, and non-profit sector.

OSRC conducted 21 training workshops, initiated 12 open source migration and adoption projects, and collaborated with nine universities, three private companies, and a number of national and international agencies in different projects (OSRC, 2008b).

A number of information sources are available on OSS applications in libraries and authors have advocated the suitability of open source to libraries. The OSS “model is culturally quite similar to the values embodied in libraries” and “represents an exciting
opportunity for libraries” (Bretthauer, 2001). OSS are solving problems for all types of libraries (Bisson, 2007) and offer cheap alternatives to expensive commercialized solutions (Wan, 2007). The review of literature establishes that underlying philosophy of OSS and libraries is the same; both promote open access and standards.

With the expansion of the telecommunication sector in Pakistan, the decade of the 1990s may be considered significant as information technology (IT) is being used in every walk of life. A most recent study by Shafique and Mahmood (2008, p. 76) conceded that “An information society is emerging at a very fast pace in Pakistan.” It further revealed that the information society applications such as e-learning, computer supported political participation, e-government initiatives, telemedicine, information, and communication technologies (ICT), cellular phones, satellite dishes, the internet, etc. indicate a prominent growth. These developments have influenced library users’ expectations; they have become more demanding.

Different types of libraries in Pakistan are adopting IT at varying pace. Ramzan (2004b) stated that IT was introduced in 1968 to produce the country’s first union catalog of scientific periodicals. According to Haider (2003), it remained a major focus of Pakistani Librarianship during the 1990s, however, the majority of libraries still lack the integrated library management systems and automation done primarily for a few selected operations. Ramzan (2004b) mentioned that lack of budget, non-availability of standard library software in local market, unskilled human resources, and management attitudes are the major problems hindering speedy adoption of IT in Pakistani libraries. Keeping in view the spreading use of ICT in society, these issues need to be addressed on a war basis. Libraries have no option but to apply sophisticated and tried and tested ICT systems to deal with increasing demands of active users, hence, meeting library aims. Librarians are aware of the immense requirement of switching over from old manual library systems to new digitized serving systems. But, the lack of finance and non availability of economical library software systems complying with the indigenous needs are stumbling blocks on the road to development.

Under these circumstances, OSS offers a great opportunity for local libraries not only to introduce low cost technological applications at large but also meet local needs by customization. The literature shows that Pakistani libraries have a good history to use free software like Computerized Documentation Service/Integrated Set of Information Systems (CDS/ISIS; Mahmood, 1998; Ramzan, 2004b). However, adoption of OSS in Pakistani libraries is just at the beginning stage in the country. Only a few projects made the first move in this direction. The PLSP’s contribution is significant as it is the first project that has adopted OSS (Koha) on a national level in legislative libraries of the country.

3. Pakistan Legislative Strengthening Project

PLSP is funded by the USAID and implemented by Development Alternative Inc. (DAI). The project works with the National Assembly and Senate and the provincial assemblies in North-West Frontier Province, Balochistan, Sindh, and Punjab. The project began in September 2005 and is expected to remain operational until December 2008 (Christopher Shield, Personal Communication, April 1, 2008).

The main PLSP program office is located in Islamabad with representatives in each of the four provincial capitals. The technical staff addresses the main project

Issues and lessons learned in OSS
components working together with counterparts at the National Assembly, Senate and Provincial Assemblies. Provincial coordinators manage the respective provincial programs providing liaison with provincial assembly leadership and staff and tailoring activities to meet the specific provincial assembly needs. International and Pakistani specialists are engaged to address specific technical areas, providing a comparative context. Program activities in each of the legislatures are focused around four following general technical areas (DAI, 2008):

1. **Representation** – assisting Pakistani legislatures to provide information to the public and receive input from citizens during the legislative process.
   Issues addressed include: media coverage of parliament, public hearings, parliamentary web sites, dissemination of legislative records, and parliamentary public relations strategies.

2. **Law making** – assisting Pakistani legislatures, including members and staff, improve the structures, and mechanisms by which legislation is analyzed, debated, and passed.
   Issues addressed include: committee structures, library and research, legislative drafting, and development of a Pakistan Institute for Parliamentary Services.

3. **Oversight/accountability** – assisting Pakistani legislatures oversee government operations, particularly in the area of budget formulation and implementation.
   Issues addressed include: question period, budget process and scrutiny; public auditing.

4. **Management/infrastructure** – assisting Pakistani legislatures improve the day-to-day management and operation of the legislative processes.
   Issues addressed include: strategic service delivery, systems development and management, equipment and hardware and software improvements, archiving and legislative records management. Resource centers have been established and are operational for the national Parliamentarians and also in each provincial assembly.

3.1 **Assistance for assembly library systems**
PLSP established the Parliamentary Librarians Working Group with participation from all houses in December 2005 as the project’s first inter-legislative working group. The main task of the group was to examine and discuss challenges to their working environment and propose improvements in legislative library policies. The major areas of concentration included: library management system, strategic management support, parliamentary librarians working group meetings, and infrastructure support.

A major undertaking of the Librarians’ Working Group was to review the library systems management module of the legislative management system proposed for the national parliament under the e-governance program and compare that to other library management systems available in the market. The ultimate objective was to propose a system common to all houses if possible (and certainly all provincial assemblies) to replace the outdated Library Automation and Management Program (LAMP), a system based on CDS/ISIS developed in Pakistan during 1990s and used by legislative libraries.
3.2 Koha project
The library management system plays a significant role in the library functioning. A number of open source library management systems are available to support the library operations. These include Emilda, OpenBiblio, Koha, Evergreen, etc. (The Creative Librarian, 2008). Koha is a true enterprise-class library management system with comprehensive functionality and impressive features (About Koha, 2008). It includes modules for circulation, cataloging, acquisitions, serials management, reserves, patron management, branch relationships, and compliant with library standards and protocols (MARC21, UNIMARC, Z39.50, etc.). It also supports major industry-standard database type (text, relational database management system) and offers independence in operating system choice to the users. Koha is fully integrated and multilingual (Unicode enable) software that provide multi-user support.

In April 2007, the Librarians' Working Group made a final assessment of the options for a common library management system and chose the open-source Koha program because of the systems' adaptability to accommodate several languages and scripts, and the potential for use as shared catalog of all legislative assembly libraries. Koha's ability to accommodate different languages script was the major attraction for legislative libraries which contained a large number of collections in different oriental languages (e.g. Urdu, Punjabi, Sindhi, Pashto, etc.).

Another important point of consideration was “sustainability.” It was assumed that Koha may be sustained after the conclusion of the PLSP, particularly since its maintenance cost is very low. Another positive point is that the OSRC may contribute in the sustainment of Koha in legislative libraries in future. The history of Koha development in the forms of different versions, their availability, and active participation of both the users and developers through mailing lists make it a viable choice of librarians in developing countries like Pakistan. Furthermore, ample support is just an email away.

PLSP has developed Provincial Information Technology Resource Centers (PITRCs) in four provincial assemblies that provide IT facilities and support to the legislators. Provincial assemblies also have their own IT/automation departments with dedicated IT professionals. It was assumed that these IT departments as well as PITRCs will provide the technical support to the assembly libraries to cope with troubleshooting of Koha. The provision of data conversion from a CDS/ISIS database (such as LAMP) to Koha was also another reason to go for Koha.

4. Major issues encountered in OSS adoption in Pakistan
4.1 Conceptual
While working with library and information science (LIS) professionals during this project, it was observed that they were not clear about OSS concept, its benefits, drawbacks, and risks. They had misconceptions such as: Free software is OSS or whoever adopts the OSS needs to become a developer, etc.

The principal researcher also observed lack of clarity about the real needs of libraries among professionals serving legislative libraries. Initially, they just stated their wishes-list instead of needs. The needs assessment is an important task to make a right decision to adopt appropriate OSS for library operations and services. Pakistani libraries need to assess their actual and perceived needs to choose the right OSS application.
4.2 Financial
Funding is a major problem in Pakistani libraries. There appeared to be a high level of dissatisfaction among libraries with their present state of funding (Mahmood et al., 2005). Ramzan (2004b) also mentioned the scarcity of financial resources in the libraries. Fully 60 percent of respondents to his survey mentioned budget (finance) as their number one problem in library automation in Pakistani libraries.

Lack of financial resources is, of course, a major issue with any development effort. “It is a simple fact that OSS are relevant to a development effort only if a reasonable investment in ICT infrastructure is made. If no hardware is available, software is good for nothing” (Rajani, 2003). Ramzan’s (2004b) study revealed that more than 23 percent of libraries did not have any computer, while 68 percent of the respondents had no network server. Although OSS offers low start-up costs as well as low cost alternative options for technical support like mailing lists, etc. yet, there is still a need of finance for hardware and human development.

4.3 Social/cultural
As already noted, the OSS model represents a “Gift Culture” and usually starts as a volunteer project. This model consists of sharing of skills and knowledge for the betterment of the whole society. In Pakistan, especially in the LIS sector, the lack of volunteer work culture is a major social issue associated with the adoption of OSS on a wider scale. The Pak-LIS scenario lacks exemplary resource sharing and collaborative initiatives (Mahmood, 2005) while open source philosophy is sharing.

The absence of collaborative culture is hindering the OSS applications in libraries at large. Librarians also face the anxiety and uncertainty of encountering change and have not been responsive to it at the desired level (Ameen, 2006). Organizational culture is also an important factor in the adoption of OSS. Jaffe and Careaga (2007) also stated that organizational culture may be an obstacle to adopt OSS solution. Nevertheless, it was the positive organizational culture that DAI approved the project with the agreement of Librarians Working Group to initiate Koha implementation project.

4.4 Technological/technical
4.4.1 Level of support available. A major issue associated with OSS is the level of support available (Ho, 2007). “With no vendor responsible for the software, support for OSS applications can vary, and often depends on the user/developer community’s commitment to the project” (Chawner, 2004). And, there is a limitation to rely on technical support which depends on someone’s response to a listserv’s request (Bretthauer, 2001). However, it is observed by the postings on mailing lists that OSS communities often respond to the requests for help or advice within minutes.

4.4.2 Documentation. Documentation is another issue associated with OSS. Documentation requires strong technical writing skill that is not necessarily possessed by every developer. Murray (2002) considered poor quality documentation a drawback of the OSS. Many open source projects face significant challenge to generate and maintain high-quality documentation (OSS Watch – Documentation Issues in Open Source, 2007; Fundamental Issues with Open Source Software Development, 2007). In PLSP’s Koha implementation project, updated documentation was prepared manually.
by choosing information pieces from different sources like Koha website, Wikipedia and mailing lists.

4.4.3 Training. Training is another technical issue associated with OSS adoption. Before initiating an OSS project, it is necessary to map out a proper and intensive training program for library staff and end-users. In PLSP, intensive training was conducted along with preparation of video demonstrations for future use. Some open source applications may necessitate specialize hardware, software, and additional technologies. It is necessary to review the existing and required hardware, software, and additional technologies before initiating an OSS project.

4.5 Human development
The scarcity of trained IT professionals is a major factor hindering the spread of OSS in developing countries like Pakistan. PLSP experienced the dearth of computer professionals skilled in Perl in the local market. Library professionals also lack the necessary skills to plan, use and implement IT in libraries (Ramzan, 2004a). The poor computer expertise of librarians is a barrier to wider acceptance of the open source systems in libraries. However, just recently, library associations and professional groups, for example the Pakistan Library Cooperation Group, conducted seminars and trainings about library management systems including Koha. These activities will ultimately raise the OSS awareness and enhance the skills of library professionals in open source technologies.

5. Recommendations
Based on the above discussion and analysis, a number of observations and recommendations can be made:

- Educational and vocational training policies should make sure that the students (both in LIS and computer sciences) get a chance to know multiple technologies, and are not limited by the predominance of a single vendor or technology in the educational curriculum and laboratories. We may assume that this step will increase the availability of professionals skilled in open source technologies in the country. This step will also ultimately help open source projects to flourish.

- The open source concept may be introduced on a wider scale among LIS professionals in Pakistan with the active programming of Pakistan Library Association and library schools by organizing seminars, lectures, workshops, etc. The OSRC may also be helpful in this regard as it conducts open source awareness-raising seminars, workshops, etc. It provides funds to support this type of events.

- The issue of technical support may be solved by a collaborative approach. Such an approach will enable them to share their experiences, skills, and developments for the betterment of all. The OSRC can also be instrumental in this regard as it offers technical support to OSS projects free of cost.

- The documentation issue may be addressed by: requiring structured documentation along with every contribution of source code; making mailing lists, chat logs, bug reports, and as much other project information as possible accessible; encouraging new, but articulate users, to contribute documentation as their first contribution to the project; allocating explicit resources to
documentation writing by the users (OSS Watch – Documentation Issues in Open Source, 2007).

- OSS applications require both an LIS and IT skill set. This issue can be addressed with the induction of IT professionals in libraries. Pakistani libraries, especially the large one like university libraries, may introduce new designations like system librarian, computer programmer, etc. for this purpose. Furthermore, libraries attached with the organizations that have their own IT departments with specialized staff, may also seek in-house help in OSS adoption. An organizational approved formal project will be highly effective to ensure the successful completion of OSS adoption. It is also important to provide organizational support for the library staff development and enable them to acquire new skills. Specialized IT courses should be main focus. The OSRC may also help in this regard as it already provides LAMP (Linux, Apache, MySQL, PHP) training free of charge.

6. Conclusions
The adoption of OSS is at an early stage in Pakistan. OSS offers many attractions to the country’s libraries which lag behind in technology adoption. OSS offers economical alternatives to costly commercialized library management systems. The open source model also gives an opportunity to library staff to be actively involved in development projects, to enhance their skills and to employ a wide range of technological application for library functions. However, the adoption of OSS on a wide scale will largely depend on long-term commitments by the organizations. Libraries and library professionals need to empower themselves with needed technological skills, and address conceptual, social, financial, technical, human issues in a collaborative manner for greater efficiency and cost savings. Moreover, the OSRC may play a vital role in pursuance of OSS adoption in Pakistani libraries on a wider scale. It is hoped that OSS adoption projects in Pakistani libraries will accomplish success by careful planning and by devising a mechanism to address the identified issues. It is hoped that this case study of the Pakistani situation will provide some insights for professionals in other developing countries who wish to adopt OSS.

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Further reading

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