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Koha enterprise resource planning system and its potential impact on information management organizations

Elisha Ondieki Makori Norak Mauti Osebe

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Introduction and background information

Koha, an open-source solution, is fundamental to transformation and change in information organizations. Koha is used for automating and integrating library management practices. Koha provides cost benefits compared to commercial solutions. Information and communications technology (ICT) infrastructure is needed for good information management practices in libraries and information centers, and increasingly, these organizations have converted to integrated library systems to manage and make their collections available for national development (Stilwel and Hoskins, 2012). Information management organizations are driven by the needs and demands of clients that are increasingly becoming dependent on technological solutions.

Worldwide, information management organizations suffer from challenges ranging from integration of technological solutions to the realities of budgetary constraints. Many academic institutions have reduced spending and subscriptions for resources (Shabi and Chinwe, 2011). Koha has been considered the premiere free and open-source enterprise resource planning system that can fulfill the needs and demands of libraries and information centers (Breeding, 2009).

Application and use of Koha is too strong to ignore, due to the hard economic situations facing institutions. There have been baseline studies on Koha especially on technical and integration issues including conferences, workshops and seminars, but none have dealt with potential impact as the enterprise resource planning system of choice. This paper explores organizational decisions made in the choice of Koha as a case study in information management organizations in Kenya focusing on the associated risks and myths.

Research study

The study included information organizations elected from academic and research institutions in both the public and private sectors. In this context, two public universities, two private ones and one corporate organization were selected. The university libraries have the mandate of providing information and knowledge to support training, teaching, learning and research activities. Data and information were collected from information professionals more than from systems librarians and library technologists and scholars.

The modern information environment in organizations is anchored on the foundation of free and open-source movement systems (Mutula and Kalaote, 2010). Across the world, free and open-source enterprise resource planning solutions into mainstream operations and services have transformed information management organizations economically, socially and institutionally into knowledge hubs (Stilwel and Hoskins, 2012; Shaul and Tauber, 2013). With many of enterprise solutions being produced into the knowledge economy, information professionals and leaders in information management organizations are faced with the daunting challenges of selecting economically viable software systems. Koha is a major free and open-source system for automating and integrating services in libraries and information centers (Breeding, 2009). In the modern cloud computing environment, the scenario has changed due to numerous reasons that above all require information management organizations to integrate solutions that are economical and cost-effective in delivery and provision of services (Shukla *et al.*, 2012; Havens and Storey, 2010). Koha is likely to be associated with various problems, risks and myths that have compromised the use of this solution in information management organizations due to lack or reliable information. Koha is a viable solution to many African and other developing countries such as Kenya. (Ogbenege and Adetimirin, 2013; Egunjobi and Awoyemi, 2013). One of the defining challenges of information management and leadership is to make decisions that are scientifically reliable and valid. The purpose of this study was to provide information from professionals and leaders with reliable, accurate and timely information related to Koha and its innovative role in the global knowledge society, and dispel the risks and myths that might be associated with the solution.

This paper focused on the need to switch to Koha, and its potential impact on information management organizations, against the risks and myths associated with the software.

Objectives of the study and research questions included:

- Information on significant benefits associated with the use of Koha system in information management organizations.
- Determine problems associated with the use of Koha.
- Establish satisfaction and dissatisfaction levels with the use of Koha.
- Propose strategic measures to mitigate risks and dispel myths associated with the use of Koha.

A literature review highlighted the following factors:

- Automation and integration of information processes, functions and operations from central and single database application, such as acquisitions, processing, storage and dissemination of quality services.
- Influences product advancements and integration with e-procurement, e-payment and mobile billing as well as e-commerce applications in relation to how information is acquired, processed, stored, retrieved and managed.
- System saves considerable effort, time and resources in handling and supporting information services.
- Performs speed computations at low cost in the process of handling and supporting delivery or transfer of information services.
- Provides increased opportunity to seamless and coherent flow of information activities internally and externally.
- Promotes the morale of the staff in acquiring new and relevant knowledge and skills, hence job satisfaction.
- Expansion of existing information activities and services and introduction of new ones.
- Provides powerful, efficient and effective information storage, processing and retrieval systems.
- Helps in the protection and security of information services against unauthorized access and use.
- Has the potential of reducing the digital divide between the "technological haves" and the "technological have-nots".
- Provides business intelligence solutions for handling, supporting, tracking and forecasting information processes and activities.
- Helps in adding value to information services and delivering the same to the market and especially to where the customer is – use of mobile devices.
- Knowledge hub that provides the platform for using and accessing digital information including electronic version of books and journals as well as mobiles devises such as iPads and personal digital assistants.
- Provides access to online information and knowledge services anywhere anytime through cloud, internet, hosted or web-based applications.

Koha free and open-source systems in Kenya and developing countries

Across the world, many countries and information management organizations have made fundamental progress of Koha use as a strategic asset in knowledge management. Historically, since its inception, Koha has gained momentum across the world as the best enterprise resource planning system for automating and integrating information management practices due to the development of the internet that fundamentally makes free and open-source software programs easily available. Economical benefits of the system are that it is absolutely free and requires minimal technical support.

Globally, governments and organizations are increasingly adopting and implementing free and open-source enterprise solutions. Open-source software development and deployment in government across the world is gaining momentum purportedly to enhance universal access, reduce costs associated with commercial software to bridge digital divides and grow in-house information technology skills (Mutula and Kalaote, 2010). Similarly, open-source software has enabled those in many countries around the world to develop digital library systems and provides researchers and students the ability to read current literature and research outputs (Krishnamurthy, 2007). Open-source software is seen as part of wider movements for more grassroots and democratic technology models in the development of a wider global information society (Pyati, 2007). Transition to the open-source software movement is a strategic plan to increasingly help governments and organizations including information management organizations to provide effective and efficient services with limited financial resources.

Numerous free and open-source enterprise resource planning systems for automating and integrating information management in organizations have been developed to handle and support operations and services, such as Koha, Evergreen, Emilda and OpenBiblio. Developed in 1999, Koha is the first free and open-source software most widely used in information management organizations with a customer base of over 500 institutions globally. From the literature review, Koha was initially the program for rural and small libraries or information centers in New Zealand until the first public library in Northern America adopted and implemented the software in 2003. Evergreen is the other free and open-source software developed in 2004 by a consortium of public libraries in Georgia and is widely used around the world in libraries and information centers. Unlike Evergreen, Koha software is widely used in African countries, more so in universities and organizations. Koha provides customer-based features that easily embrace new technological innovations in the market, for instance, integration with business intelligence solutions like radio frequency identification to enhance self-issue and self-return of information materials.

Modern information environment, media landscape and technological innovation are increasingly influencing the traditional physical library creating modern communication-based library rather than a collection-based one (Hellen, 2007). Modern learning resource centers provide information and knowledge hubs that place greater emphasis on client needs and demands in regard to ICT solutions – social computing services, media centers, information skills, learning development services, teaching, accommodation, space for informal learning or group work, laptop use and catering facilities (Makori, 2009). Learning resource centers aim to deliver high-quality information resources and services to support excellence in learning, teaching, research, publishing and community activities in universities in Kenya, the USA and elsewhere. In Kenya, International University, Kenyatta University and Catholic University of Eastern Africa have built modern learning resource centers.

Universities libraries in Kenya have implemented integrated information management systems to keep abreast with the benefits and risks of the modern knowledge-based economy. Most information-based agencies in institutions of higher learning in the country have adopted and implemented open-source software (OSS) systems

largely due to financial limitations that face their parent organizations. Big information management organizations in academic and public libraries use commercial solutions, while small learning and knowledge media centers in school or special libraries equally use proprietary systems. Universities libraries of University of Nairobi (UoN) and Catholic University of Eastern Africa (CUEA) use V-Smart software, which is one of the top-end five systems in the global information environment, while SirsiDynix is used at the USA International University (USIU) library. Koha enterprise resource planning information management system is widely used in universities of Kenyatta and Strathmore as well as host of other organizations (Table I).

Baseline studies have helped information management organizations around the world to accept and implement Koha in the Americas, Europe, Asia, Africa and Australia. Initially, there were issues regarding Koha's suitability in relation to MARC compliance and related technological issues, but the first public library in Northern America took the lead initiative to address this issue. In North American countries of the USA, Canada and Mexico, the software is widely used in library and information establishments of higher education, faith-based institutions, schools and organizations. Among the first implementations of Koha in the UK, it was determined that it was not only very successful, but also influenced decisions of other libraries and information centers via the CAMLIS project (Bissels and Chandler, 2010). France's policy on open-source software has increased the use of specific applications in universities. Three university libraries collectively cooperated in installation, customization and implementation of Koha (Espiau-Bechetoille *et al.*, 2011). Similarly, in Italy, CILEA, a consortium of universities founded in 1974, has participated actively in the Koha community since 2008, including several subprojects. CILEA has worked on Italian translation and on writing a correct default configuration for Italian libraries (Tajoli *et al.*, 2011).

The Chinese government policy requires ministries and agencies to use open-source software as the first option (Mutula and Kalaote, 2010). In particular, the Koha community has led to the development of Koha-Taiwan that basically provides services to Chinese users across the world (Chang *et al.*, 2013). In India, open-source software is providing the first step in helping to close the digital divide (Sharma and Adkins, 2006). University and department libraries at Cochin University of Science and Technology use Koha for automation and integration purposes (Cherukodan *et al.*, 2013). In April 2007, Pakistan librarians selected Koha as the best integrated library and information management system with comprehensive functionality and impressive features. Koha's ability to accommodate different languages and scripts, and the potential for use as a shared catalog of all legislative assembly libraries provided integration of a large number of collections in different oriental languages such as Urdu, Punjabi, Sindhi and Pushto (Rafiq and Ameen, 2009).

Widespread use of Koha in Australian special libraries and related agencies indicates that the free and open-source option has enabled many libraries to greatly enhance services to remote users (Keast, 2011). Within the African context, Koha is used in many countries, including South Africa, Egypt, Nigeria, Malawi, Zambia, Zimbabwe, Gambia, Eritrea, Ethiopia, Congo, Burundi, Tanzania and Kenya. Koha has already found favor in two private Nigerian universities (Bowen and Redeemer) and one college (Adeyemi College of Education) where the system is widely used to handle and support information work and services (Ogbenege and Adetimirin, 2013; Egunjobi and Awoyemi, 2013). In the modern cloud computing economy, coupled with numerous issues of quality services, customer needs and demands, limited financial budgeting and spending and the digital environment have demonstrated that there is a need to critically evaluate and analyze potential benefits of Koha.

The modern information environment is rapidly becoming innovative with systems that are free and open-but less commercial. Across the globe, organizations are increasingly using these technologies to expand and provide quality- and customer-focused services. With the transition from millennium development goals to sustainable development, the focus is for organizations to invest in systems and solutions that are economically beneficial, viable, easy to use, maintain and manage. These aspects touch on a number of theories involving return on investment and the technology acceptance model (TAM) (Rupak *et al.*, 2014; Havens and Storey, 2010; Awa *et al.*, 2011). Information management organizations have to adopt IT solutions that are economically beneficial to deliver quality- and customer-based products and services.

Return on investment stresses on cost-benefit analysis to the institutions in terms of economic performance and value, quality services and monetary gains. In the modern economic environment, information management organizations must get value for money-in and money-out in development and provision of information products and services (Havens and Storey, 2010). Consequently, customers need to get quality information products and services. Institutions of higher learning

Table I.
Resource planning systems in information management organizations

Enterprise information systems	Information management organizations	
	Public organizations	Private organizations
V-Smart	University of Nairobi	Catholic University of Eastern Africa
SirsiDynix	United States International University	
Koha	Kenyatta University	Strathmore University
	Technical University of Kenya	Umma University
	Parliament of Kenya	Kenya Institute of Management

have reduced financial budgets from government and sponsors, and therefore any spending committed must demonstrate perceived usefulness and impact in providing information and knowledge to support teaching, learning and research activities (Shabi and Chinwe, 2011). Koha provides value- and quality-based services through timely access to information, convenience to digital and electronic resources and a knowledge portal that provides information, metadata management and online information resources.

The fundamental basis of TAM involves the critical aspects of user acceptance with perceived usefulness and perceived ease of use (Rupak *et al.*, 2014) that normally addresses the concerns and feelings of the customers. In this context, the solution must be perceived prior to being accepted and embraced by the stakeholders. Technology acceptance and user performance requirements are central to effective and efficient utilization of Koha. Information organizations adopting Koha are based on the perceived usefulness, benefits, return on investment, compatibility and integration, challenges and attitudes and behavior. The theories provide useful knowledge that addresses issues regarding technological investment and acceptance in information management organizations.

Research study and discussion

This study used a descriptive design that is applied in preliminary and exploratory studies to gather information, summarize, present and interpret for the purpose of clarification. Descriptive design enabled the study to construct questions that helped solicit the desired data, identify the means of conducting and gathering, summarizing and presenting the information. The study was confined to selected information management organizations with Koha, while additional information was gathered through literature review scans and surveys that included document or desk review analysis. In addition, expert opinions and ideas from information professionals were selected and utilized. The purpose was to gather comprehensive and in-depth information from information professionals within and outside Kenya. The study involved five information management organizations. These included two public and private universities each one public organization and ten information professionals, systems librarians and library ICT staff; and expert opinions from scholars.

Structured or a close-ended questionnaire and document review guides were used for gathering and collecting data and information from the respondents. The close-ended questionnaire was used to obtain in-depth information on Koha and its potential impact on information management organizations. The study also used document analysis from reputable sources to collect data and information. Documents examined or analyzed included electronic or digital versions of books and journals from a variety of publications. In addition, Koha weblogs and related websites provided up-to-date information. Data and information obtained through were reviewed, analyzed and organized into relevant themes and subthemes of the study. To address issues of bias, the respondents participated in the data collection process on a volunteer basis in addition. Above all, the study involved mainly respondents who provided comprehensive information and knowledge.

Widespread use of the software that was initially developed for rural and small libraries into a global one is proof enough that the free and open-source software movement is slowly being accepted into the information and knowledge environments (Chang *et al.*, 2013, Espiau-Bechetoille *et al.*, 2011, Keast, 2011, Tajoli *et al.*, 2011). To obtain information on the potential benefits of Koha in information management organizations in Kenya, the respondents were requested to select from a list (results are .provided in Figure 1

Koha integration allows automation of information and knowledge management operations, functions and services including administration, acquisitions, serials management, cataloging, circulation, OPAC, reference, interlibrary loan and community services. In addition, this process enhances and improves delivery of services to the customers the "hallmark" of any information and knowledge organization. In particular, over 95 per cent of the respondents acknowledged that the integrated mechanism makes it possible to track down information resources and services from the time the order is made and received in the acquisitions, processed and circulated. Further testimonies from the respondents concluded that integration avoids duplication of multiple entries of bibliographic records in the system. The system provides for one-time entry and access of bibliographic records that is used for all operations and functions.

In one of the university, the systems librarian noted that the library adopted and implemented Koha without incurring any expenses, and the institution has been offering consultancy services to other information centers wanting to use the system. requires only minimum expenses in terms of implementation, customization, maintenance and support issues. In addition, the software

Figure 1. *Potential benefits associated with the use of Koha system*

is developed, customized and shared free of charge (Mutula and Kalaote, 2010; Rafiq and Ameen, 2009; Krishnamurthy, 2007). In situations where technological skills and competencies of the information professionals are wanting, it is possible to outsource these skills at an affordable cost. 90 per cent of the respondents noted that the expenses that are incurred in terms of development, implementation, post implementation, support, maintenance and training of staff are quite low when compared with commercial software.

Koha's source code is freely available providing excellent opportunities and flexibility to develop, adapt and modify the software. Koha can be accessed and shared among information organizations with affiliated institutions and agencies (Rafiq and Ameen, 2009). Respondents affirmed that information management and organizations and information professionals in equal measure can use and share the software with affiliated colleges, campuses or institutions or among themselves with an 80 per cent response rate.

75 per cent of respondents agreed that Koha automates and integrates cross-cutting technological solutions, such as social media, Web 2.0 tools, RFID and e-learning systems (e.g. Moodle), and database management systems like an open-journal system. Modern information clients are highly versatile, confident and comfortable with computers and digital media. Koha provides online collaboration and sharing of information services such as social media like Facebook. Koha provides a rich environment for clients to interact, collaborate and socialize.

Challenges or problems associated with the use of Koha system

A combination of factors – social, economic, education and institutional politics – has continued to haunt the development of Koha in many organizations. Respondents were asked to identify and select from the list, challenges or problems that affect the use of Koha (Table II).

Koha application and usage practices are hindered due to lack of shared and coordinated vision regarding training, retooling and recruitment of competent staff as well as acquisition (procurement) of hardware and software. Information professionals and leaders must have the capacity to demonstrate and understand the overall vision of their organization. One must identify information needs and problems and provide strategic solutions to enhance delivery of services to the customers. The administration and leadership skills are required to ensure adequate personnel and staffing. Lack of adequate resources is another major problem commonly associated with failure in implementation. All respondents agreed that information management organizations lack resources that are necessary in implementing and using enterprise and integrated systems. The hard economic realities facing most institutions can be disastrous to all the operations and services and maintain the systems. Information professionals lack the requisite knowledge, skills and competencies that are essential in handling, managing and supporting the system. In addition, there is a lack of leadership and strategic planning. This is because some of the major problems associated with the implementation of Koha are lack of ICT, such as data conversion and uploading, and limited staff, hardware and software.

There are also physical challenges such as poor information infrastructures, telecommunication systems and internet connectivity (e.g. broadband optic fiber and wireless technologies and hot spots) and web portals to facilitate access to electronic databases such as electronic books and journals. Information leaders may also face institutional challenges brought by technological, social and emotional problems as well as inability to accept change. Ng (2011) noted that management is a combination of leadership, communication and people skills and equates a manager without any leadership skills to a ship sailing on high seas without the use of a compass and gyroscope. In the knowledge-based economy, professional leaders need inclusive management-based approaches to meet challenges that might hinder quality and excellent delivery of services to the customers. Information professionals need to borrow and learn leadership and management practices from other fields of specialization as exemplified in business and politics.

The third objective of the study was to establish the extent to which information management organizations are satisfied with Koha and the majority (90 per cent) indicated that both information management organizations and end users (staff and clients) are satisfied with the levels of access and use of Koha.

The fourth objective of the study was to propose strategic measures to mitigate the risks and myths associated with the use of Koha. In this respect, the respondents proposed strategic measures necessary for successful development and use. Respondents noted that knowledge management organizations and information professional leaders must provide the following:

- Be competently trained in all aspects of Koha development, implementation, customization, programming, maintenance and server management.
- Have an ICT policy to provide direction and guidelines in all technological systems and solutions in information organizations.
- Leadership skills are critical to the success of any project including the ability to provide vision and direction of technology acceptance and performance.

Table II.
Problems associated with the use of Koha system

Problems associated with usage	Yes (%)	No (%)
Lack of shared and coordinated vision	95	5
Lack of adequate resources	90	10
Lack of knowledge, skills and competencies	80	20
Lack of leadership, management and strategic planning qualities	75	25
Institutional and physical issues	70	30
Resistance to transform and accept change	65	35

- Proper implementation is not only a necessary requirement but also the means of ensuring if the needs of the organization are met in terms of development, customization, training and documentation.
- Ability to adapt and embrace innovative and smart solutions that are less expensive.

Conclusion and recommendations

- In the modern cloud computing environment, Koha provides potential business-to-business opportunities that influence information professionals to deliver quality- and customer-based services.
- Entrepreneurship and economic aspects of Koha such as benefits and ease of use have widely influenced its adoption and usage in information organizations.
- Due to difficult economic situations facing information management organizations, Koha provides a more sustainable solution than commercial options.
- Technical support through online forums and helpdesks provide maintenance assistance where problems associated with the system are shared and solved.
- It is mandatory for information professionals to provide knowledge inclusivity in relation to innovative and smart solutions to enable organizations to provide needed services to users.

This study provides useful information and knowledge on the potential benefits and cost-benefit analysis of Koha. In this context, comprehensive knowledge is given that dispels the risks and myths associated with the adoption and use of the system. Second, the free and open-source movement provides effective and efficient cloud enterprise systems and solutions. Third, in the modern business environment, delivery of quality- and customer-based products and services are critical to users, organizations and information professionals. Finally, Koha is a highly reliable, stable, maintained and versatile technology and most importantly recommended for use in information management organizations with a proven record of success.

There is a need for a wider study involving more stakeholders to ascertain the reliability and validity of the findings. Further research to unearth critical factors and reasons as to why most information management organizations worldwide prefer commercial systems over proprietary solutions is needed.

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Elisha Ondieki Makori (*elishaondieki@yahoo.com*) is based at University of Nairobi, Nairobi, Kenya.

Norak Mauti Osebe is based at Adventist University of Africa, Nairobi, Kenya.